water & sanitation
Department:
Water and Sanitation
REPUBLIC OF SOUTH AFRICA

**REPORT NO. : P WMA 12/T30/00/5314/9**

# Environmental Impact Assessment

for the proposed

# MZIMVUBU WATER PROJECT

DEA Ref. No.: 14/12/16/3/3/2/677 (Dam construction)
14/12/16/3/3/2/678 (Electricity generation)
14/12/16/3/3/1/1169 (Roads)

# VISUAL IMPACT ASSESSMENT

**SEPTEMBER 2014**


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# ENVIRONMENTAL IMPACT ASSESSMENT FOR THE MZIMVUBU WATER PROJECT

| | |
|---|---|
| *Report Title:* | ***Visual Impact Assessment*** |
| *Authors:* | *Menno Klapwijk* |
| *Project name:* | ***Environmental Impact Assessment for the Mzimvubu Water Project*** |
| *DWS Report Number:* | *P WMA 12/T30/00/5314/7* |
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*Chief Director: Integrated Water Resource Planning*

# ENVIRONMENTAL IMPACT ASSESSMENT FOR THE MZIMVUBU WATER PROJECT

## LIST OF REPORTS

| REPORT TITLE | DWS REPORT NUMBER |
|---|---|
| Inception Report | P WMA 12/T30/00/5314/1 |
| Scoping Report | P WMA 12/T30/00/5314/2 |
| Environmental Impact Assessment Report | P WMA 12/T30/00/5314/3 |
| Environmental Management Programme | P WMA 12/T30/00/5314/14 |
| Water Use Licence Application Supporting Documents | P WMA 12/T30/00/5314/4 |
| Ntabelanga Dam borrow pits and quarry Environmental Management Plan | P WMA 12/T30/00/5314/5 |
| Lalini Dam borrow pits and quarry Environmental Management Plan | P WMA 12/T30/00/5314/6 |
| SUPPORTING REPORTS | |
| Social Impact Assessment | P WMA 12/T30/00/5314/7 |
| Economic Impact Assessment | P WMA 12/T30/00/5314/8 |
| **Visual Impact Assessment** | P WMA 12/T30/00/5314/9 |
| Floral Impact Assessment | P WMA 12/T30/00/5314/10 |
| Faunal Impact Assessment | P WMA 12/T30/00/5314/11 |
| Heritage Impact Assessment | P WMA 12/T30/00/5314/12 |
| Water Quality Study | P WMA 12/T30/00/5314/13 |
| Aquatic Ecology Assessment | P WMA 12/T30/00/5314/15 |
| Wetland Assessment | P WMA 12/T30/00/5314/16 |

# ENVIRONMENTAL IMPACT ASSESSMENT FOR THE MZIMVUBU WATER PROJECT

**DEA REF No. 14/12/16/3/3/2/677 (Dam construction application)**
**14/12/16/3/3/2/678 (Electricity generation application)**
**14/12/16/3/3/1/1169 (Roads application)**

*This report is to be referred to in bibliographies as:*

*Department of Water and Sanitation, South Africa (2014).* ***Environmental Impact Assessment for the Mzimvubu Water Project: Visual Impact Assessment***

***DWS Report No:*** **P WMA 12/T30/00/5314/9**

*Prepared for: Directorate – Options Analysis*

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## DECLARATION OF INDEPENDENCE

I, Menno Klapwijk, as authorised representative of Bapela Cave Klapwijk, & Associates hereby confirm my independence as a specialist and declare that neither I nor Bapela Cave Klapwijk have any interest, be it business, financial, personal or other, in any proposed activity, application or appeal in respect of which Bapela Cave Klapwijk was appointed as visual impact assessment specialists in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), other than fair remuneration for worked performed, specifically in connection with the Social Impact Assessment for the Mzimvubu Water Project Environmental Impact Assessment. I further declare that I am confident in the results of the studies undertaken and conclusions drawn as a result of it – as is described in my attached report.

Signed: Date:

# ENVIRONMENTAL IMPACT ASSESSMENT FOR THE MZIMVUBU WATER PROJECT

# VISUAL IMPACT ASSESSMENT

## *Executive summary*

### INTRODUCTION

The Department of Water and Sanitation (DWS) commissioned the Mzimvubu Water Project, an integrated multi-purpose (domestic water supply, agriculture, power generation, transport, tourism, conservation and industry) project, with the intention of providing a socio-economic development opportunity for the region.

As part of this EIA process Bapela Cave Klapwijk (BCK) have been contracted to undertake a Visual Impact Assessment.

The project footprint spreads over three District Municipalities (DMs) namely the Joe Gqabi DM in the north west, the OR Tambo DM in the south west and the Alfred Nzo DM in the east and north east.

The proposed Ntabelanga Dam site is located approximately 25 km east of the town of Maclear and north of the R396 Road. The proposed Lalini Dam site is situated approximately 17 km north east of the small town Tsolo. Both are situated on the Tsitsa River.

The impact assessment was undertaken for only the main components of the project. This study addresses the visual impacts associated with the larger components of the project. These include the two dam sites, namely the Ntabelanga and Lalini Dams, the alternative transmission lines from the Lalini Dam hydropower station, the Tsolo Irrigation scheme and the main Tsolo and Maclear access roads.

Other ancillary components construction camps, minor power lines, borrow areas and quarries have not been addressed in this report. The water pipeline reticulation and associated reservoirs was also not addressed as it was assumed that the rehabilitation specifications would mitigate the construction and operation visual impact.

This study evaluated the visual impact of the Mzimvubu Water Project and alternatives with a view to assessing its severity based on the author's experience, expert opinion and accepted techniques.

## METHOD

In order to address the objectives of the study the following method has been used:

- Determine the setting, visual character and land use of the area surrounding the project area, and the Genius Loci (sense of place). This was done in terms of:
  - Topography
  - Vegetation cover
  - Land use
  - Visibility
  - Landscape diversity
  - Landscape character
- Discussions and meetings with the specialist consultant team to identify specific aspects of the construction and development which would affect the visual quality of a setting;
- Define the extent of the affected visual environmental, the viewing distance and the critical views;
- An evaluation was made of the landscape characteristics against which impact criteria ratings were applied;
- The viewshed, the area within which the proposed project can be visible, was determined using digital 1:50 000 topographic maps with 20 m contour intervals analyzed by the Geographic Information System (GIS) algorithms available in the ArcView Software Suite.

The assessment is based on the routes, ground-truthed during a field inspection in March 2014.

## LIMITATIONS, CONSTRAINTS AND ASSUMPTIONS

The following assumptions and limitations are applicable to this study:

- The basis for this assessment is that scenic wilderness areas form the core of eco-tourism due to the high positive aesthetic appeal;
- The assessment is based on assumed demographic data. No detailed study was done to determine accurate data on potential viewers of the project components. If necessary these studies could be undertaken during the design phase of the project;
- Determining a visual resource in absolute terms is not achievable. Evaluating a landscape's visual quality is both complex and problematic. Various approaches have been developed but they all have one problem in common: unlike noise or air pollution, which can be measured in a relatively simple way, for the visual landscape mainly qualitative standards apply. Therefore subjectivity cannot be excluded in the assessment procedure (Lange 1994). Individually there is a great variation in the

evaluation of the visual landscape based on different experiences, social level and cultural background. Exacerbating the situation is the inherent variability in natural features. Climate, season, atmospheric conditions, region, sub-region all affect the attributes that comprise the landscape. What is considered scenic to one person may not be to another (NLA, 1997);

- Localized visual perceptions of the economically depressed communities have not been tested as these may be influenced rather by the economic and job opportunities that would exist rather than the direct visual perception of the project;

- The viewshed map is computer generated and does not take into account local and minor visual interruptions in the landscape such as trees on the edge of roads, minor landforms, buildings, etc. As a result the visibility on these maps could be overstated.

- The assessment does not consider the ancillary project infrastructure and components such as borrow pits, spoil dumps, construction camp sites, reservoirs, etc. These components will be assessed in detail during the design phase should the project be implemented;

- Detailed site specific mitigation for each cut and fill slope is not provided. This will be addressed by the landscape architect during the detailed design phase of the project should it go ahead;

- The 'no project' alternative was not specifically addressed as it is likely that the existing landscape will remain in its existing condition;

If the study, however, determined that the negative visual impact is of such a magnitude and significance that it will seriously influence the decision on whether or not to build, it will then be necessary to test and determine the visual perceptions of neighbouring communities. Such a study is involved, costly and time consuming.

## FINDINGS

The impact assessment was undertaken for only the dam sites, transmission lines, roads and irrigation areas. This study evaluated the visual impact of the Mzimvubu Water Scheme with a view to assessing its severity based on the author's experience, expert opinion and accepted techniques.

Based on the field observations and the studies herein, and with the implementation of the mitigation measures, the following conclusions are made from a visual point of view:

All the project components will exert a negative influence on the visual environment. This is largely due to:

- high visibility of components within a relatively visually uniform landscape;
- impact on the visual quality and the sense of place;
- impact on selected critical views;
- the height and scale of the components could be dominant in the landscape;
- high visibility of construction and operation activity within large areas of uniform visual pattern;
- the low Visual Absorption Capacity of some of the settings which is attributable to:
  - undulating topography;
  - uniform and monotonous vegetation cover;
  - the lack of visual diversity.

The significance of the visual impact during construction and operation is regarded as:

- Ntabelanga Dam

  The significance of the visual impact is considered **Medium-Low** (a rating of 2 on a scale of 1-5) during construction and operation.

- Lalini Dam

  The significance of the visual impact is considered **Medium-Low** (a rating of 2 on a scale of 1-5) during construction and operation.

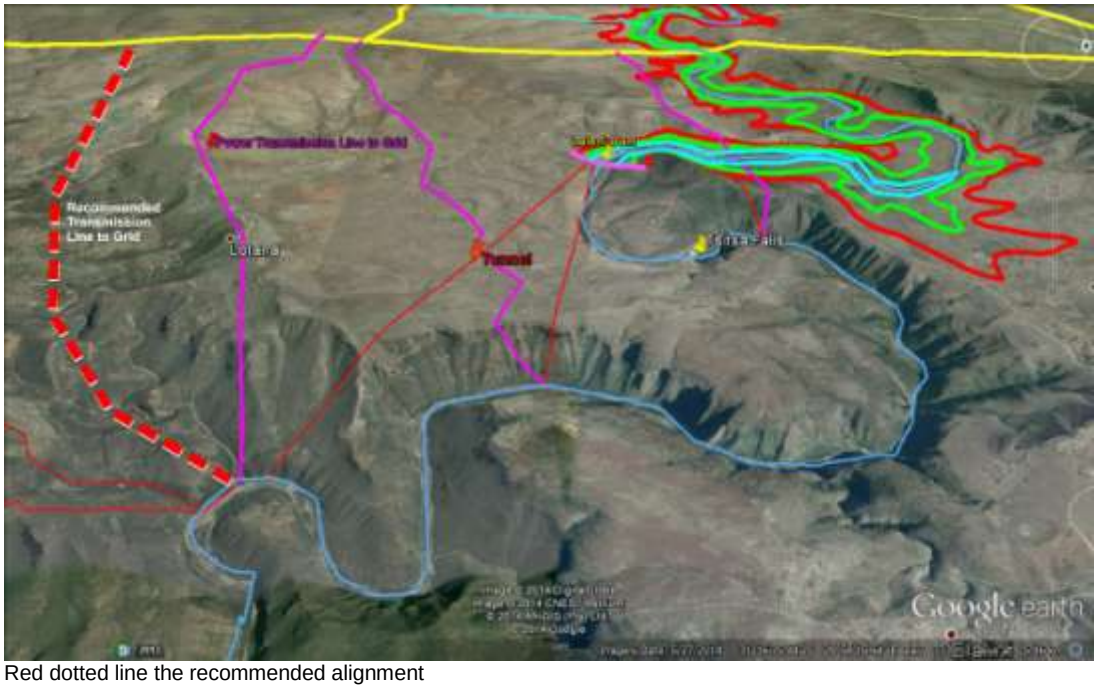
- Transmission Lines

  The significance of the visual impact of Transmission Line 3 (option located furthest downstream for the Tsitsa Falls) is regarded as **Low** (a rating of 1 on a scale of 1-5), for transmission Line 2 is **Medium** (a rating of 3) and for Transmission Line 1 (closest to the Falls) it is regarded as **Very High** (a rating of 5 on a scale of 1-5).

  Roads

  The impact significance for the Road from Maclear, the Road from Tsolo and the Measures roads is regarded as **Medium-Low** (a rating of **2** on a scale of 1-5).

In conclusion, based on the field observations and the studies herein, from a visual point of view, it is recommended that the alignment of **Transmission Line 3** be realigned to avoid the ridge as set out in **Figure (i), Recommended Transmission Line Alignment.**




Red dotted line the recommended alignment

**Figure (i): Recommended Transmission Line Alignment**

# ENVIRONMENTAL IMPACT ASSESSMENT FOR THE MZIMVUBU WATER PROJECT – VISUAL IMPACT ASSESSMENT

## DEA REF No. 14/12/16/3/3/2/677 (Dam construction application) 14/12/16/3/3/2/678 (Electricity generation application) 14/12/16/3/3/1/1169 (Roads application)

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## Acronyms and abbreviations

| | |
|---|---|
| BID | Background Information Document |
| BCK | Bapela Cave Klapwijk |
| DM | District Municipality |
| DWS | Department of Water and Sanitation |
| EIA | Environmental Impact Assessment |
| NEMA | National Environmental Management Act |
| VIA | Visual Impact Assessment |
| VAC | Visual Absorption Capacity |
| GIS | Geographic Information System |

## List of Units

| | |
|---|---|
| MW | Mega Watt |
| m | Metres |
| $km^2$ | Square Kilometres |
| ha | Hectare |
| °C | Degrees Celsius |
| % | Percentage |

# 1. INTRODUCTION

## 1.1 BACKGROUND

The Department of Water and Sanitation (DWS) commissioned the Mzimvubu Water Project, an integrated multi-purpose (domestic water supply, agriculture, power generation, transport, tourism, conservation and industry) project, with the intention of providing a socio-economic development opportunity for the region.

Environmental authorisation is required for the infrastructure components of the project. The purpose of the Environmental Impact Assessment (EIA) is to assess the components of the project that are listed activities by the National Environmental Management Act (NEMA) for which the Department of Water and Sanitation (DWS) has the mandate and intention to implement. The EIA process will provide the information that the environmental authorities require to decide whether the project should be authorised or not and if so then under what conditions.

As part of this EIA process Bapela Cave Klapwijk (BCK) have been contracted to undertake a Visual Impact Assessment.

## 1.2 PURPOSE OF THIS REPORT

This visual assessment is a specialist study to determine the visual effects of the proposed Mzimvubu Water Project on the surrounding environment.

The primary objective of this specialist study is therefore to describe the potential impact of these structures on the visual character and sense of place of the area. This Specialist Study will have the following objectives:

- Determine the visual character of the areas along the proposed route by evaluating environmental components such as topography, current land use activities, surrounding land use activities, etc.;
- Identify elements of particular visual quality that could be affected by the proposed project;
- Describe and evaluate the specific visual impacts of the preferred individual components of the dams and associated infrastructure from critical viewpoints and view fields;
- Determine the extent of the visibility of the project from surrounding areas;
- Specific consideration should be given to the identification of requirements for further investigation;

- Recommend mitigation measures to reduce the potential visual impacts generated by the proposed project;

- The assessment should assess impacts according to the criteria and terminology as indicated by ILISO.

## 1.3 DETAILS AND EXPERTISE OF THE SPECIALIST

Menno Klapwijk, a principal member of Bapela Cave Klapwijk, has specialised for 31 years in environmental planning, construction rehabilitation and control, visual impact assessment, and landscape site design. Significant visual impact projects include: Sani Pass Upgrade, Zeerust Solar Park, Aggeneys Solar Park, N3 De Beers Pass Route, Moatize Power Plant (Mozambique), Transnet Multi-purpose Pipeline, Saldanha Steel, Mozal (Alusaf – Mozambique), Letsibogo Dam (Botswana), Blue Circle Cement Factory (East London), Phlogopite Factory (Phalaborwa), Iscor Heavy Minerals Smelter (Empangeni), many VIA's for Eskom transmission lines and substations, Mmamabula 400kV Transmission Line, Mine and Power Plant (Botswana), West Coast Combined Cycle Gas Turbine Power Plant (CCGT), De Hoop Dam and Pipeline (Sekhukuneland), Tugela Water Project (KwaZulu-Natal), Delportshoop Tower Mast (Delportshoop, Northern Cape), N3 Toll Road, Cedara (KwaZulu-Natal) to Heidelberg (Gauteng), Maputo Steel Project (Maputo, Mazambique), Ga-Pila Village (Potgietersrus, Limpopo Province) and Pom Pom Camp (Okavango, Botswana).

He has more than 100 publications and reports dealing mostly with environmental planning, environmental rehabilitations and control specification, environmental impact assessment and visual impact assessment.

| | |
|---|---|
| 1983: | B.Sc (Land Arch), Texas A & M |
| 1986: | Environmental Impact Assessment, Graduate School of Business, UCT |
| Registered: | South African Council for Landscape Architecture Practitioners (SACLAP) |
| Member: | Institute of Landscape Architects of South Africa (ILASA) |
| Member: | American Society of Landscape Architects (ASLA) |
| Member: | International Association of Impact Assessors (SA) |
| Council: | Council for the Built Environment (CBE) |
| Member | |

## 1.4 STRUCTURE OF THIS REPORT

This specialist study is undertaken in compliance with Regulation 32 of GN 543. **Table 1** below indicates how the requirements of Regulation 32 of GN 543 have been fulfilled in this report.

**Table 1: Report content requirements in terms of Regulation 32 of GN 543**

| Regulatory Requirements in terms of Regulation 32 of GN 543 | Section of Report |
|---|---|
| (a) The person who prepared the report; and the expertise of that person to carry out the specialist study or specialised process. | Chapter 1 |
| (b) a declaration that the person is independent | Page iv |
| (c) an indication of the scope of, and the purpose for which, the report was prepared | Chapters 1 and 3 |
| (d) a description of the methodology adopted in preparing the report or carrying out the specialised process | Chapter 3 |
| (e) a description of any assumptions made and any uncertainties or gaps in knowledge | Chapter 4 |
| (f) a description of the findings and potential implications of such findings on the impact of the proposed activity, including identified alternatives, on the environment | Chapters 6 to 10 |
| (g) recommendations in respect of any mitigation measures that should be considered by the applicant and the competent authority | Chapter 14 |
| (h) a description of any consultation process that was undertaken during the course of carrying out the study | Chapter 11 |
| (i) a summary and copies of any comments that were received during any consultation process | Chapter 11 |
| (j) any other information requested by the competent authority. | Chapter 12 |

# 2. PROJECT BACKGROUND SUMMARY

## 2.1 LOCALITY

The project footprint spreads over three District Municipalities (DMs) namely the Joe Gqabi DM in the north west, the OR Tambo DM in the south west and the Alfred Nzo DM in the east and north east.

The proposed Ntabelanga Dam site is located approximately 25 km east of the town of Maclear and north of the R396 Road. The proposed Lalini Dam site is situated approximately 17 km north east of the small town Tsolo. Both are situated on the Tsitsa River.

## 2.2 MAIN PROJECT COMPONENTS

Water Resource Infrastructure includes:

- A dam at the Ntabelanga site with a storage capacity of 490 million $m^3$;
- A dam at the Lalini site with a storage capacity of approximately 150 million $m^3$;
- A pipeline and tunnel, and a power house at the Lalini Dam site for generating hydropower;
- Five new flow measuring weirs will be required in order to measure the flow that is entering and released from the dams. These flow gauging points will be important for monitoring the implementation of the Reserve and for operation of the dams.
- Wastewater treatment works at the dam sites;
- Accommodation for operations staff at the dam sites; and
- An information centre at each of the dam sites.

The Ntabelanga Dam will supply potable water to 539 000 people, which is estimated to rise to 730 000 people by year 2050. The domestic water supply infrastructure will include:

- A river intake structure and associated works;
- A regional water treatment works at the Ntabelanga Dam;
- Potable bulk water distribution infrastructure for domestic and industrial water requirements (primary and secondary distribution lines);
- Bulk treated water storage reservoirs strategically located; and
- Pumping stations.

The Ntabelanga Dam will also provide water to irrigate approximately 2 900 ha. This project includes bulk water conveyance infrastructure for raw water supply to edge of field.

About 2 450 ha of the high potential land suitable for irrigated agriculture are in the Tsolo area and the rest near the proposed Ntabelanga Dam and along the river, close to the villages of Machibini, Nxotwe, Culunca, Ntshongweni, Caba, Kwatsha and Luxeni.

There will be a small hydropower plant at the Ntabelanga Dam to generate between 0.75 MW and 5 MW (average 2.1 MW). This will comprise a raw water pipeline from the dam to

a building containing the hydropower turbines and associated equipment, and a discharge pipeline back to the river just below the dam wall. The impact is expected to be similar to that of a pumping station.

The hydropower plant at the proposed Lalini Dam and tunnel (used conjunctively with the Ntabelanga Dam) will generate an average output of 30 MW when operated as a base load power station and up to 150 MW if operated as a peaking power station. The power plant will require a pipeline (approximately 4.6 km) and tunnel (approximately 3.2 km) linking the dam to the power plant downstream of the dam and below the gorge.

The power line to link the Lalini power station to the existing Eskom grid will be approximately 18.5 km and the power line linking the Ntabelanga Dam to the Eskom grid will be approximately 13 km. Power lines will be constructed to supply power for construction at the two dam sites and for operating five pumping and booster pumping stations along the bulk distribution infrastructure.

The area to be inundated by the dams will submerge some roads. Approximately 80 km of local roads will therefore be re-aligned. Additional local roads will also be upgraded to support social and economic development in the area. The road design will be very similar to the existing roads as well as be constructed using similar materials.

The project is expected to cost R 12.45 billion and an annual income of R 5.9 billion is expected to be generated by or as a result of the project during construction and R 1.6 billion per annum during operation. It will create 3 880 new skilled employment opportunities and 2 930 un-skilled employment opportunities during construction.

## 2.3 ALTERNATIVES

The following project level alternatives will be assessed:

- Three hydro-power tunnel positions and associated power lines;
- Peak versus Base load power generation;
- Three different dam sizes for the Lalini Dam; and
- The no project option.

For the construction camps, pipeline routes and new roads, the specialist will identify any sensitive areas and deviations to avoid these will be proposed in consultation with the technical team.

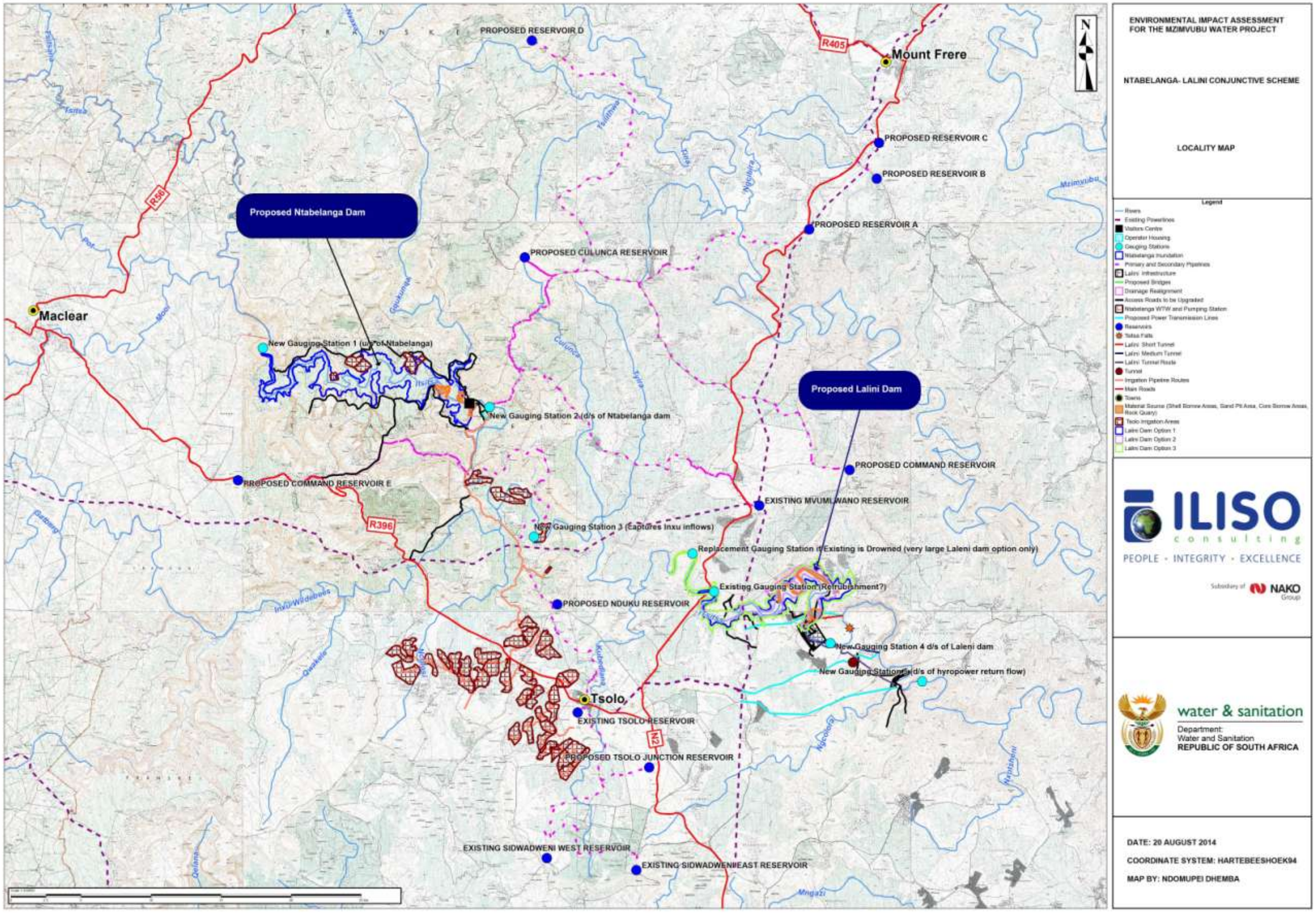



**Figure 1: Locality map**

# 3. TERMS OF REFERENCE

## 3.1 SCOPE OF THE STUDY

This study will address the visual impacts associated with the larger components of the project. These include the two dam sites, namely the Ntabelanga and Lalini Dams, the alternative transmission lines from the Lalini Dam hydropower station, the Tsolo Irrigation scheme and the main Tsolo and Maclear access roads.

Other ancillary components, such as construction camps, minor power lines, borrow areas and quarries have not been addressed in this report. The water pipeline reticulation and associated reservoirs was also not addressed as it was assumed that the rehabilitation specifications would mitigate the construction and operation visual impact

## 3.2 METHODOLOGY

**Method**

In order to address the objectives of the study the following method has been used:

- Determine the setting, visual character and land use of the area surrounding the project area, and the Genius Loci (sense of place). This was done in terms of:

  - Topography
  - Vegetation cover
  - Land use
  - Visibility
  - Landscape diversity
  - Landscape character

- Discussions and meetings with the specialist consultant team to identify specific aspects of the construction and development which would affect the visual quality of a setting;

- Define the extent of the affected visual environmental, the viewing distance and the critical views;

- An evaluation was made of the landscape characteristics against which impact criteria ratings were applied;

- The viewshed, the area within which the proposed project can be visible, was determined using digital 1:50 000 topographic maps with 20 m contour intervals analysed by the Geographic Information System (GIS), algorithms available in the ArcView Software Suite.

The assessment is based on the area ground-truthed during a field inspection in March 2014.

## 3.3 IMPACT CRITERIA AND RATING SCALE

The social impacts are rated in accordance with the Environmental Impact Assessment Regulations, 2010 and the criteria drawn from the IEM Guidelines Series, Guideline 5: Assessment of Alternatives and Impacts, published by the (DEAT, 2006) as well as the Guideline Document on Impact Significance (DEAT, 2002) as listed below.

The key issues identified during the Scoping Phase inform the terms of reference of this specialist study. Each issue consists of components that on their own or in combination with each other give rise to potential impacts, either positive or negative, from the project onto the environment or from the environment onto the project. The significance of the potential impacts is considered before and after identified mitigation is implemented, for direct, indirect, and cumulative impacts, in the short and long term.

A description of the nature of the impact, any specific legal requirements and the stage (construction/decommissioning or operation) is given. Impacts are considered to be the same during construction and decommissioning.

The following criteria have been used to evaluate significance:

- **Nature:** This is an appraisal of the type of effect the activity is likely to have on the affected environment. The description includes what is being affected and how. The nature of the impact will be classified as positive or negative, and direct or indirect.

- **Extent and location:** This indicates the spatial area that may be affected (**Table 2**).

**Table 2: Geographical extent of impact**

| Rating | Extent | Description |
|---|---|---|
| 1 | Site | Impacted area is only at the site – the actual extent of the activity. |
| 2 | Local | Impacted area is limited to the site and its immediate surrounding area |
| 3 | Regional | Impacted area extends to the surrounding area, the immediate and the neighbouring properties. |
| 4 | Provincial | Impact considered of provincial importance |
| 5 | National | Impact considered of national importance – will affect entire country. |

- **Duration:** This measures the lifetime of the impact (**Table 3**).

**Table 3: Duration of Impact**

| Rating | Duration | Description |
|---|---|---|
| 1 | Short term | 0 – 3 years, or length of construction period |
| 2 | Medium term | 3 – 10 years |
| 3 | Long term | > 10 years, or entire operational life of project. |
| 4 | Permanent – mitigated | Mitigation measures of natural process will reduce impact – impact will remain after operational life of project. |
| 5 | Permanent – no mitigation | No mitigation measures of natural process will reduce impact after implementation – impact will remain after operational life of project. |

- **Intensity/severity:** This is the degree to which the project affects or changes the environment; it includes a measure of the reversibility of impacts (**Table 4**).

**Table 4: Intensity of Impact**

| Rating | Intensity | Description |
|---|---|---|
| 1 | Negligible | Change is slight, often not noticeable, natural functioning of environment not affected. |
| 2 | Low | Natural functioning of environment is minimally affected. Natural, cultural and social functions and processes can be reversed to their original state. |
| 3 | Medium | Environment remarkably altered, still functions, if in modified way. Negative impacts cannot be fully reversed. |
| 4 | High | Cultural and social functions and processes disturbed – potentially ceasing to function temporarily. |
| 5 | Very high | Natural, cultural and social functions and processes permanently cease, and valued, important, sensitive or vulnerable systems or communities are substantially affected. Negative impacts cannot be reversed. |

- **Potential for irreplaceable loss of resources:** This is the degree to which the project will cause loss of resources that are irreplaceable (**Table 5**).

**Table 5: Potential for irreplaceable loss of resources**

| Rating | Potential for irreplaceable loss of resources | Description |
|---|---|---|
| 1 | Low | No irreplaceable resources will be impacted. |
| 3 | Medium | Resources can be replaced, with effort. |
| 5 | High | There is no potential for replacing a particular vulnerable resource that will be impacted. |

- **Probability:** This is the likelihood or the chances that the impact will occur (**Table 6**).

**Table 6: Probability of Impact**

| Rating | Probability | Description |
|---|---|---|
| 1 | Improbable | Under normal conditions, no impacts expected. |
| 2 | Low | The probability of the impact to occur is low due to its design or historic experience. |
| 3 | Medium | There is a distinct probability of the impact occurring. |
| 4 | High | It is most likely that the impact will occur |
| 5 | Definite | The impact will occur regardless of any prevention measures. |

- **Confidence:** This is the level of knowledge or information available, the environmental impact practitioner or a specialist had in his/her judgement (**Table 7**).

**Table 7: Confidence in level of knowledge or information**

| Rating | Confidence | Description |
|---|---|---|
| | Low | Judgement based on intuition, not knowledge / information. |
| | Medium | Common sense and general knowledge informs decision. |
| | High | Scientific / proven information informs decision. |

- **Consequence:** This is calculated as extent + duration + intensity + potential impact on irreplaceable resources.

- **Significance:** The significance will be rated by combining the consequence of the impact and the probability of occurrence (i.e. consequence x probability = significance). The maximum value which can be obtained is 100 significance points (**Table 8**).

**Table 8: Significance of issues (based on parameters)**

| Rating | Significance | Description |
|---|---|---|
| 1-14 | Very low | No action required. |
| 15-29 | Low | Impacts are within the acceptable range. |
| 30-44 | Medium-low | Impacts are within the acceptable range but should be mitigated to lower significance levels wherever possible. |
| 45-59 | Medium-high | Impacts are important and require attention; mitigation is required to reduce the negative impacts to acceptable levels. |
| 60-80 | High | Impacts are of great importance, mitigation is crucial. |
| 81-100 | Very high | Impacts are unacceptable. |

- **Cumulative Impacts:** This refers to the combined, incremental effects of the impact. The possible cumulative impacts will also be considered.

- **Mitigation:** Mitigation for significant issues will be incorporated into the EMP.

The visual impact will, however, vary when evaluated against the criteria of intensity of visual impact and the significance of the impact.

An example is the situation where a project component such as a toll plaza or bridge is located within a fairly narrow undisturbed valley between two rising landforms. The visual impact's intensity is low since it cannot be seen from surrounding areas. The component has the hillsides as a backdrop and therefore blends into the valley texture. The significance, however, is high within the context of the scenic value of the pristine valley because the sense of place and the character of the valley are severely compromised.

The converse is also true in that a high visual intensity impact can have a low significance. The visual impact assessment will therefore be based on the criteria of intensity and significance relative to land use and the nearness to important viewpoints.

## 3.4 LEGISLATION AND GUIDELINES CONSIDERED

There are no specific legal requirements nor is there any direct reference to the visual environment in the legislation. General legislation pertaining to the environment is contained in the National Environmental Management Act (NEMA) (Act No. 107 of 1998) as well as the National Heritage Resources Act No. 25, 1999 and the associated provincial regulations provide legislative protection for listed or proclaimed sites, such as urban conservation areas, nature reserves and proclaimed scenic routes.

The National Environmental Management Principles as contained in NEMA require that sustainable developments require the following considerations (amongst others):

2(4)(ii) that pollution and degradation of the environment are avoided, or, that where they cannot be altogether avoided, are minimised and remedied; and

2(4)(iii) that the disturbance of landscapes and sites that constitute the nation's cultural heritage is avoided, or where it cannot be altogether avoided, is minimised and remedied.

The National Heritage Resources Act refers, under Part 1 General Principles, to the National Estate:

3.(2)(d) Landscapes and natural features of cultural significance

Visual pollution is controlled to a limited extent, by the Advertising on Roads and Ribbons Act (Act No. 21 of 1940) which deals mainly with signage on public roads.

The Protected Areas Act (NEMA) (Act 57 of 2003, Section 17) is also intended to protect natural landscapes

The Western Cape DEA&DP have produced 'A Guideline for Involving Visual and Aesthetic Specialists in EIA Processes'

# 4. ASSUMPTIONS AND LIMITATIONS

The following assumptions and limitations are applicable to this study:

- The basis for this assessment is that scenic wilderness areas form the core of eco-tourism due to the high positive aesthetic appeal;
- The assessment is based on assumed demographic data. No detailed study was done to determine accurate data on potential viewers of the project components. If necessary these studies could be undertaken during the design phase of the project;
- Determining a visual resource in absolute terms is not achievable. Evaluating a landscape's visual quality is both complex and problematic. Various approaches have been developed but they all have one problem in common: unlike noise or air pollution, which can be measured in a relatively simple way, for the visual landscape mainly qualitative standards apply. Therefore subjectivity cannot be excluded in the assessment procedure (Lange 1994). Individually there is a great variation in the evaluation of the visual landscape based on different experiences, social level and cultural background. Exacerbating the situation is the inherent variability in natural features. Climate, season, atmospheric conditions, region, sub-region all affect the attributes that comprise the landscape. What is considered scenic to one person may not be to another (NLA, 1997);
- Localized visual perceptions of the economically depressed communities have not been tested as these may be influenced rather by the economic and job opportunities that would exist rather than the direct visual perception of the project;
- The viewshed map is computer generated and does not take into account local and minor visual interruptions in the landscape such as trees on the edge of roads, minor landforms, buildings, etc. As a result the visibility on these maps could be overstated.
- The assessment does not consider the ancillary project infrastructure and components such as borrow pits, spoil dumps, construction camp sites, reservoirs, etc. ;
- Detailed site specific mitigation for each cut and fill slope is not provided. This will be addressed by the landscape architect during the detailed design phase of the project should it go ahead;
- The 'Do Nothing' alternative was not specifically addressed as it is likely that the existing landscape will remain in its existing condition;

If the study, however, determined that the negative visual impact is of such a magnitude and significance that it will seriously influence the decision on whether or not to build, it will then be necessary to test and determine the visual perceptions of neighbouring communities. Such a study is involved, costly and time consuming.

# 5. DESCRIPTION OF THE AFFECTED ENVIRONMENT

## 5.1 DESCRIPTION OF THE NATURAL PHYSICAL ELEMENTS

The natural physical elements are described according to broad topographical regions (Figure 2: Landscape Types). These landscape types correlate closely with the vegetation types as described by Low and Rebelo (1996) as these types take into account the topographical makeup of the area. The proposed project components traverse two distinct landscape types and two biomes.

These landscape types have been used solely for the purpose of defining the landscape components and are not intended to refer to the flora studies.

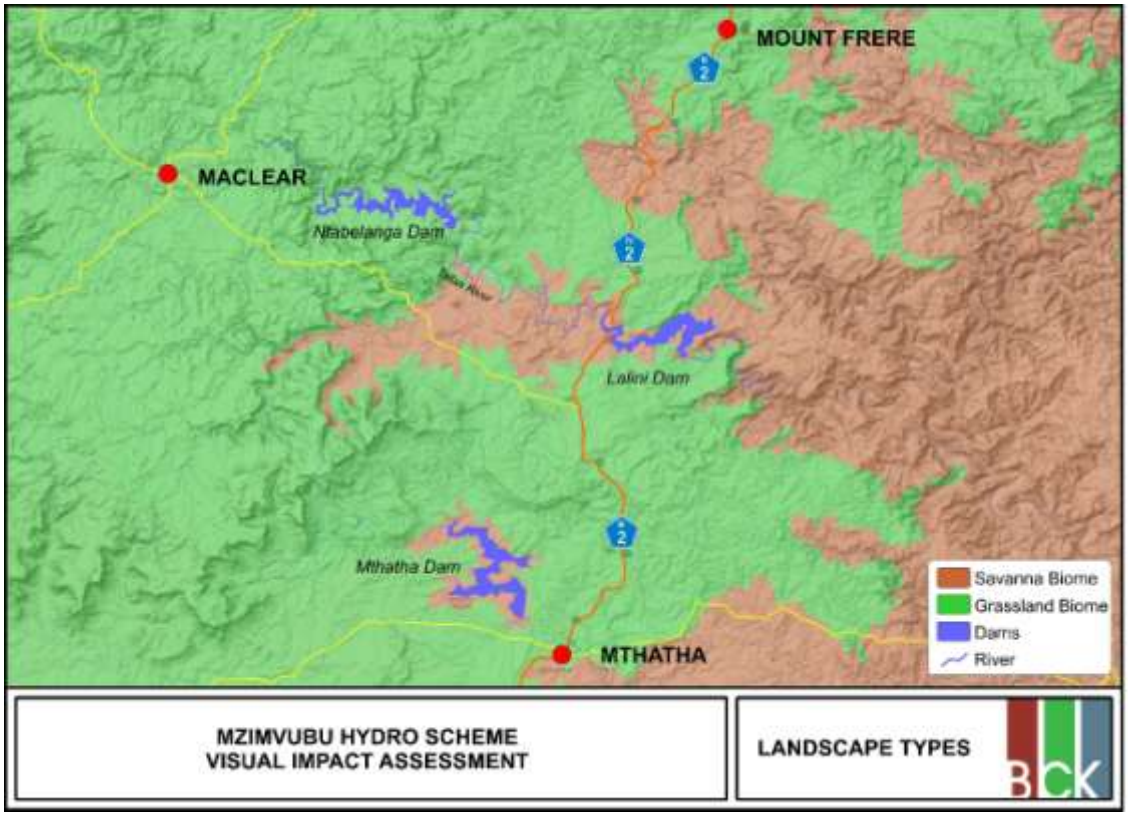



**Figure 2: Landscape Types**

The landscape types are:

Grassland Biome
Savannah Biome

The extent of the visual impact of the project will depend on the following characteristics of the receiving environment:

### Topography

Topography describes the landform that gives rise the physical setting.

### Vegetation Cover

Vegetation refers to the vegetation cover in terms of visual diversity and not in terms of botanical characteristics.

### Land Use

Land use is described in terms of the visual mix of land uses that is a function of land diversity and character.

### Visibility

Visibility is described in terms of the areas that theoretically have direct line of sight in relation to distance the viewer is away from the object. Critical affected views are also described.

### Landscape Diversity

Landscape diversity is a function of topography, vegetation and land use. The greater the diversity, the greater is the potential for the proposed development to blend with the surrounding landscape.

### Landscape Character

The spirit, or sense of place, is that quality imparted by the aspects of scale, colour, texture, landform, enclosure, and in particular, the land use. According to K. Lynch (1992) 'it is the extent to which a person can recognise or recall a place as being distinct from other places as having a vivid, or unique, or at least a particular character of its own'.

The quality of Genius Loci is a function of attributes such as the scenic beauty or uniqueness and distinctive character of the built and cultural landscape.
The visual quality is the visual significance given to a landscape determined by cultural values and the landscape's intrinsic physical properties (Smardon, et al, 1986). While many factors contribute to a landscape's visual quality, they can ultimately be grouped under three headings: vividness, intactness and unity.

The visual quality can be categorised under relative headings such as high, medium and low visual quality for the study area. High refers to those areas that have a high aesthetic appeal such as mountains, river valleys, unspoilt coastal zones and wilderness areas. The

medium areas are those that have high visual diversity, but which have already been modified by human activity comprising the aesthetic appeal such as roads, minor infrastructure and settlements. The low visual quality areas are those that are relatively highly populated and which have been heavily impacted on by human activity such as industrial and mining areas or which have a low aesthetic appeal due to a lack of landscape diversity or interest.

The study area focuses on a 10 km radius around each of the project components.

### 5.1.1 Ntabelanga Dam

**Topography**

The dam basin is located within an east-west valley with rising hills to the north and south. The Tsitsa River, on which the dam is located, flows from west to east to just past the dam wall where it then flows south and then east towards the proposed Lalini Dam.

Deep dongas are evident where the soils are deep and easily erodible.

**Implications for the Project**

The rising landscape surrounding the site enables this proposed dam to be visually contained to within a 6 km viewshed zone.

The waterline edge will follow the line of the topography which is sympathetic with the landscape and forms a natural blended edge

**Vegetation Cover**

The vegetation for almost the entire dam basin consists of low grasslands with patches of trees occurring within the valleys, kloofs, sheltered sites, rocky hills and ridges.

The Grassland landscape types are generally open, uniform in texture and start resulting in a visually open landscape. However, most of the vegetation is disturbed, ploughed or heavily overgrazed and degraded

**Implications for the Project**

The uniformly textured vegetation of the Open Grassland landscape types will visually contrast significantly with the dam making it more visible in the landscape. The low vegetation height does not assist in screening the proposed dam nor does it assist in blending it with the landscape.

However, the lack of a diverse vegetation cover limits the opportunity to blend the dam visually with the landscape and will leave it visually exposed.

**Visibility**

The visibility is contained within the valleys by the surrounding rising landforms and valley slopes and limits views to approximately 1.5 - 5.0 km. Intermittent views are possible up to 7 km away from the higher landforms. **(Figure 3: Ntabelanga Dam: Viewshed)**.

Critical views are from the surrounding local villages such as Luxeni on the north bank and Bongweni, Komkulu, KuQulungashe and Siqungqwini on the south bank. Critical views are also those from the surrounding access roads.

**Implications for the Project**

Visibility is generally uninterrupted throughout the viewshed. None of these views should be negatively impacted as the views will not detract from the existing aesthetic appeal of the area nor will it affect any land-use that relies on the visual environment for it to exist

**Landscape Diversity**

Landscape diversity within the viewshed is primarily based on the topographical features as the vegetation, namely grasslands, is relatively uniform in texture and height.

The landscape exhibits a great degree of horizontal and vertical scale due to the surrounding hills and ridges that provide a landscape in proportion to the scale of the dam.

The study area is already modified by human activity such as the various scattered settlements, roads and ploughed, terraced lands which add to a more diverse landscape.

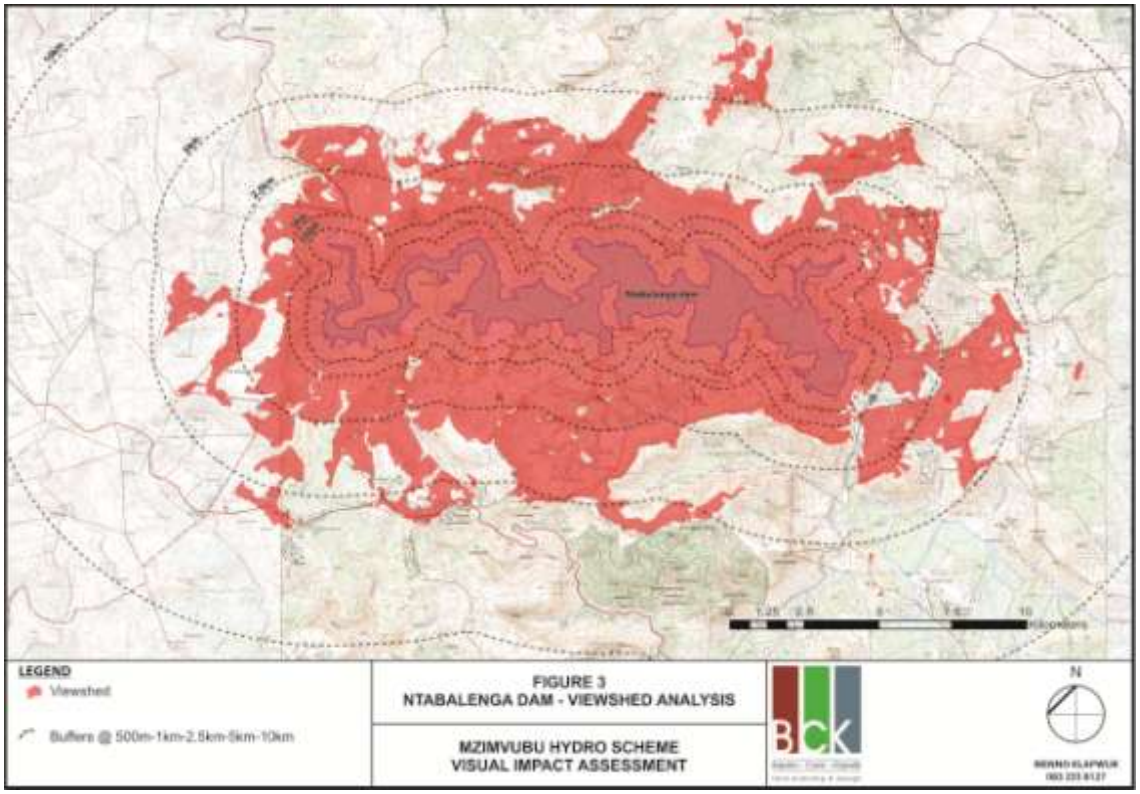



**Figure 3: Ntabelanga Dam: Viewshed**

**Implications for the Project**

The higher the visual diversity, the greater is the opportunity to visually blend the dam with the environment as these will more readily accept visual change or any structure placed within them. The higher the diversity, the higher is the Visual Absorption Capacity (VAC) or the ability of the environment to accept visual change.

The low diversity of the open and uniform vegetation together with the diversity of the human activity and the rising landforms adds towards a low to moderate diversity

The lack of visual diversity within this Grassveld landscape biome will result in a low VAC and will in turn result in any large scale structure to be highly visible due to the lack of screening and the high visual contrast. The hills and ridges together with the scattered settlements display a slightly higher visual diversity due to the more diverse topography and the odd patches of trees. However, this still does not provide sufficient diversity to raise the VAC to moderate for this area.

**Landscape Character**

The hills and ridges exhibits a well-defined and vivid sense of spatial definition with a moderate scenic quality due to the combination of low gentle valleys, open grasslands. The

character of the landscape can be regarded as rural agriculture, predominantly stock grazing and subsistence farming.

**Implications for the Project**

The introduction of a dam within this landscape will alter the character considerably due to the size and scale of it. The dam will considerably alter the sense of place and Genius Loci of the study area. However, the change in character is not considered to be significantly negative and aesthetically unpleasing.

The introduction of this element in the landscape has the potential to promote tourist-based enterprises that rely on the high scenic quality as the basis for their business.

### 5.1.2 Lalini Dam

**Topography**

The dam basin is generally U-shaped in an east-west and north-south direction surrounded by hills mainly to the north, east and south. The dam wall is located in the east of the dam on the Tsitsa River. The dam site is located about 3.5 km upstream of the very scenic Tsitsa Falls.

Soils are shallow on the side slopes of the hills. Deeper soils along the drainage lines have resulted in eroded dongas.

**Implications for the Project**

The rising landscape surrounding the site enables this proposed dam to be visually contained to within a 5 km viewshed zone.

The waterline edge will follow the line of the topography which is sympathetic with the landscape and forms a natural blended edge

**Vegetation Cover**

The vegetation, as with most of the study area, for almost the entire dam basin, consists of low grasslands with patches of trees occurring within the valleys, kloofs, sheltered sites, rocky hills and ridges.

The Grassland landscape types are generally open, uniform in texture and start resulting in a visually open landscape. However, most of the vegetation is disturbed, ploughed or heavily overgrazed and degraded.

The Tsitsa valley downstream consists of Valley Thicket and is relatively intact in terms of visual quality

**Implications for the Project**

The uniformly textured vegetation of the Open Grassland landscape types will visually contrast significantly with the dam making it more visible in the landscape. The low vegetation height does not assist in screening the proposed dam nor does it assist in blending it with the landscape.

The lack of a diverse vegetation cover limits the opportunity to blend the dam visually with the landscape and will leave it visually exposed.

**Visibility**

The visibility is contained within the valleys by the surrounding rising landforms and valley slopes and limits views to approximately 1.5 - 5.0 km. Intermittent views are possible up to 8 km away from the higher landforms. **(Figure 4: Lalini Dam: Viewshed).**

Critical views are from the surrounding local villages such as Mhlabathi and Upper Rosa to the north, Shawbury and Mtshazi to the northeast, Lolana to the Southeast and Mahoyana to the east of the Tsitsa Falls. Critical views are also those from the surrounding access roads.

**Implications for the Project**

Visibility is generally uninterrupted throughout the viewshed. None of these views should be negatively impacted as the views will not detract from the existing aesthetic appeal of the area nor will it affect any land-use that relies on the visual environment for it to exist

**Landscape Diversity**

Landscape diversity within the viewshed is primarily based on the topographical features and the vegetation, namely grasslands, is relatively uniform in texture and height.

The landscape exhibits a great degree of horizontal and vertical scale due to the surrounding hills and ridges that provide a landscape in proportion to the scale of the dam

The study area is already modified by human activity such as the various scattered settlements, roads and ploughed, terraced lands which add to a more diverse landscape

**Implications for the Project**

The low diversity of the open and uniform vegetation together with the diversity of the human activity and the rising landforms adds towards a low to moderate diversity

The lack of visual diversity within this Grassveld landscape biome will result in a low VAC and will in turn result in any large scale structure to be highly visible due to the lack of screening and the high visual contrast. The hills and ridges together with the scattered settlements display a slightly higher visual diversity due to the more diverse topography and the odd patches of trees. However, this still does not provide sufficient diversity to raise the VAC to moderate for this area.

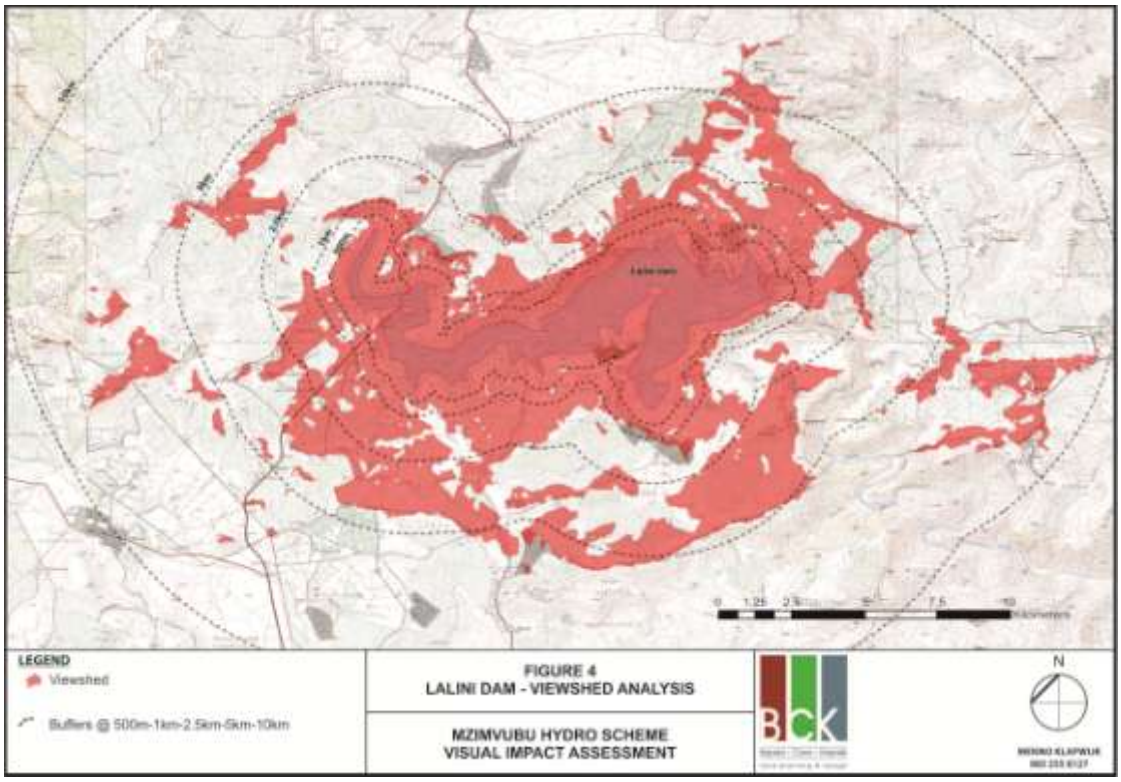



**Figure 4**: **Lalini Dam: Viewshed**

**Landscape Character**

The hills and ridges exhibit a well-defined and vivid sense of spatial definition with a moderate scenic quality due to the combination of low gentle valleys, open grasslands and the scattered settlements. The character of the landscape can be regarded as rural agriculture, predominantly stock grazing and subsistence farming.

**Implications for the Project**

The introduction of a dam within this landscape will alter the character considerably due to the size and scale of it. The dam will considerably alter the sense of place and Genius Loci of the study area. However, the change in character is not considered to be significantly negative and aesthetically unpleasing.

The introduction of this element in the landscape has the potential to promote tourist-based enterprises that rely on the high scenic quality as the basis for their business, especially with the Tsitsa Falls in close proximity.

### 5.1.3 High Voltage Power Transmission Lines

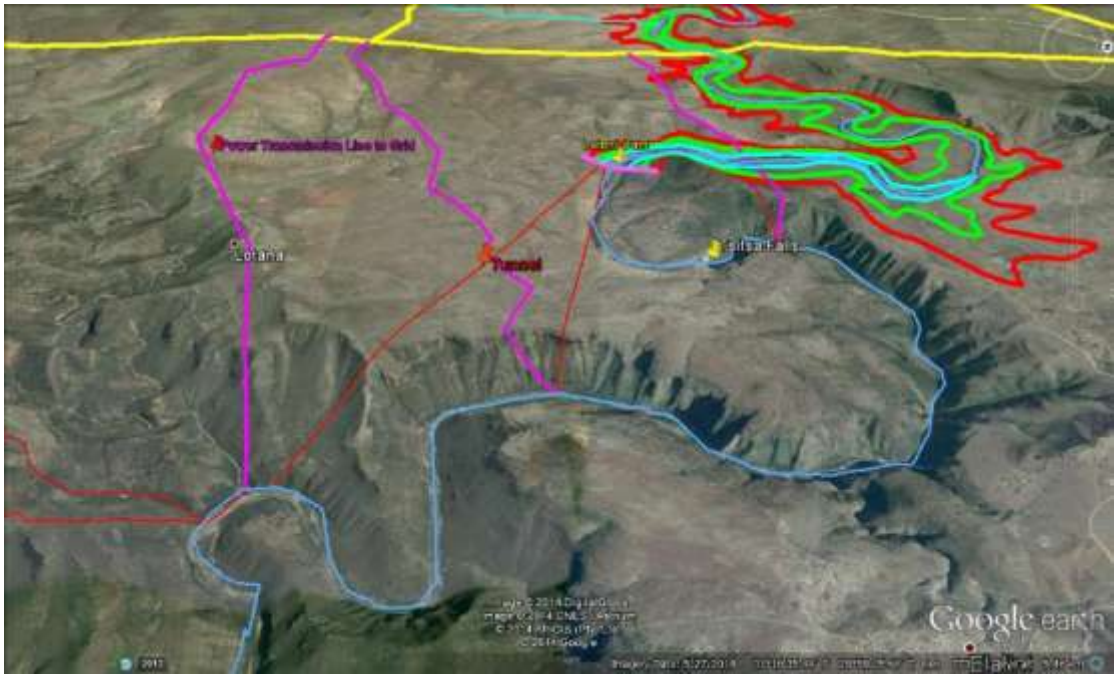
**Topography**

All three routes run east west across the landscape from the Tsitsa River to the Eskom grid that runs north-south just west of Gwali **(Figure 5: Powerlines Locality Plan)**. The routes rise up out of the Tsitsa river valley onto the upper plateau over a rolling open landscape to where it meets the national grid approximately 18 km away. Powerline 1 is fairly close to the Tsitsa Falls which is probably the major scenic attraction in the area. The valley is steep sided from the falls downstream for approximately 14 km.

**Implications for the Project**

The valley sections assist in screening the pylons when viewed in silhouette but once they emerge onto the open plateau they are easily read against the skyline as there are no landforms to assist with screening.

Powerline 3 which lies to the south runs along the top edge of a valley that links up with the Tsitsa River. It is recommended that the route be adjusted to follow the valley bottom all the way to the national grid line rather than on top where it will be far more visible




(Transmission Lines are in pink)

**Figure 5: Transmission Lines Locality Plan**

### Vegetation Cover

The vegetation, as with most of the study area, consists of low grasslands with patches of trees occurring within the valleys, kloofs, sheltered sites, rocky hills and ridges.

The Grassland landscape types are generally open, uniform in texture and start resulting in a visually open landscape. However, most of the vegetation is disturbed, ploughed or heavily overgrazed and degraded.

The Tsitsa valley consists of Valley Thicket vegetation and is relatively intact in terms of visual quality. The hills around the Tsitsa Falls are covered with trees.

### Implications for the Project

The uniformly textured vegetation of the Open Grassland landscape types will visually contrast significantly with the pylons making them more visible in the landscape. The low vegetation height does not assist in screening them nor does it assist in blending them with the landscape. The lack of a diverse vegetation cover limits the opportunity to blend the pylon structures visually with the landscape and will leave them visually exposed.

The sections where the routes traverse the valley slopes, which are fairly densely covered with trees, will become very visible where a servitude will have to be cut. It will be recommended that just the minimum vegetation should be removed especially if Powerlines 1 or 2 are selected.

### Visibility

The visibility within the valley is contained by the surrounding rising landforms to approximately 1 km. As the transmission lines rise up out to the valley they become very exposed and are visible for many kilometres. **(Figures 6, 7 and 8: Powerlines 1, 2 and 3: Viewsheds)**.

Powerline 1 is the closest to the dam wall and the Tsitsa Falls. Although it is the shortest of the routes the visual exposure extends at least 7.5 km to the north east as well as to the south east. The hydro-station will be located in a relative unspoilt treed valley where the slopes of the valley limit views to approximately1.5 - 5.0 km. Although the pylons are well screened within the valley the servitude that will need to be cleared for access will greatly contrast with the surrounding vegetation and be visually obvious. Intermittent views are possible up to 8 km away from the higher landforms.

Powerline 2 is more contained by the landscape than Powerline 1 and is generally limited as a continuous view to approximately 3 km. Views occurred from the higher lying areas to the north are Intermittent and up to a distance of 10km

Powerline 3 rises out of the valley further down the river and runs along the edge of the plateau next to a valley where it stands out proud in the open landscape. The visual exposure is uninterruptedly visible northwards for at least 5 km with sporadic views possible up to 10 km. Views to the south are more scattered but also extend to at least 10 km.

Critical views are from the surrounding local villages such as Mhlabathi and Upper Rosa to the north, Shawbury and Mtshazi to the northeast, Lolana to the Southeast and Mahoyana to the east of the Tsitsa Falls. Critical views are also those from the surrounding access roads.

**Implications for the Project**

Although the transmission line routes are very visible and exposed within the open and low vegetation, the rolling topography created by the surrounding landscape assists in containing the view impact to generally no more than 5 km.

The valley that runs parallel to Powerline 3 would greatly assist in reducing the visual exposure of the line if placed within the valley rather than on top along the edge of the escarpment

**Landscape Diversity**

Landscape diversity within the viewshed is similar to the dam study sites and is primarily based on the topographical features and human interventions as the vegetation, namely grasslands, is relatively uniform in texture and height.

The landscape exhibits a great degree of horizontal and vertical scale in the vicinity of the Tsitsa River due to the surrounding hills, ridges and steep-sided valley bottom that provide a scale in proportion to the scale of the pylons. However, once the lines rise out of the valley they traverse an open rolling landscape that is already modified by human activity such as the various scattered rural settlements, roads and ploughed, terraced lands which add to a more diverse landscape.

Implications for the Project

The low diversity of the open and uniform vegetation together with the diversity of the human activity and the rising landforms adds towards a low to moderate diversity

The visual diversity within this Grassveld landscape biome will result in a low to moderate VAC. The hills and ridges together with the scattered settlements display a slightly higher visual diversity due to the more diverse topography and the odd patches of trees. However, this still does not provide sufficient diversity and will still result in any large scale structure to be highly visible due to the lack of screening and the high visual contrast.

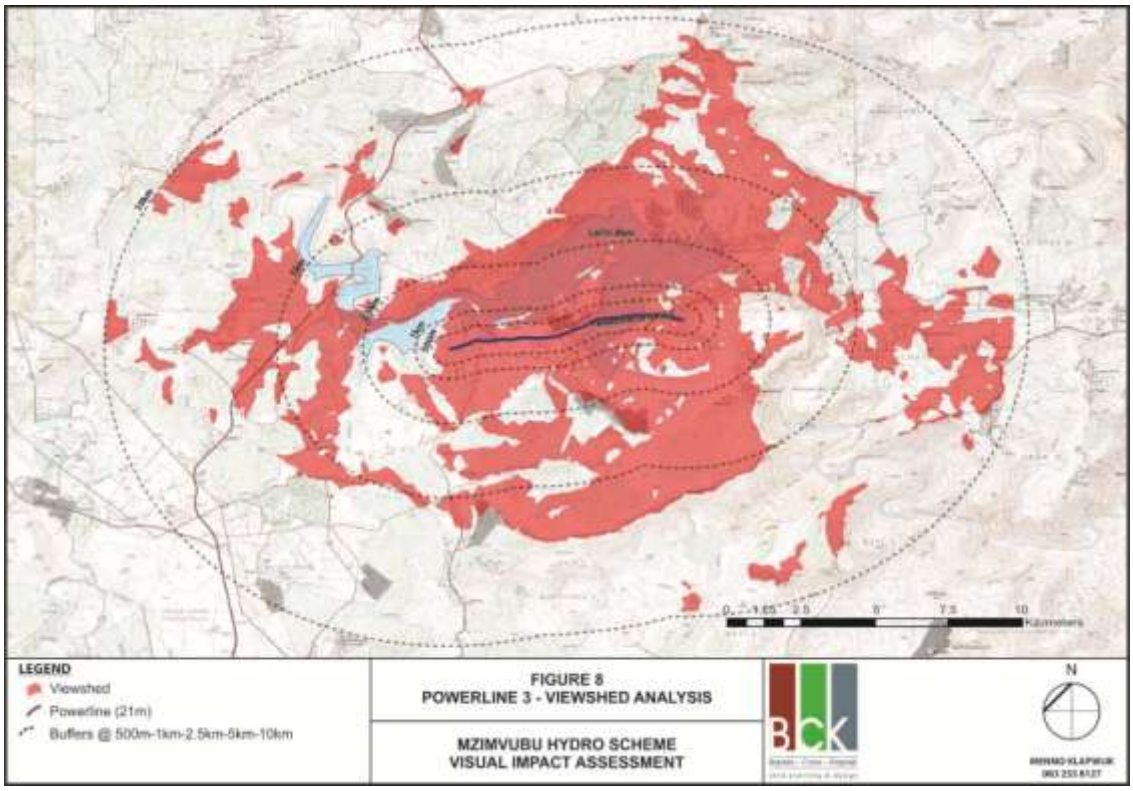



**Figure 6: Powerline 1: Viewshed**

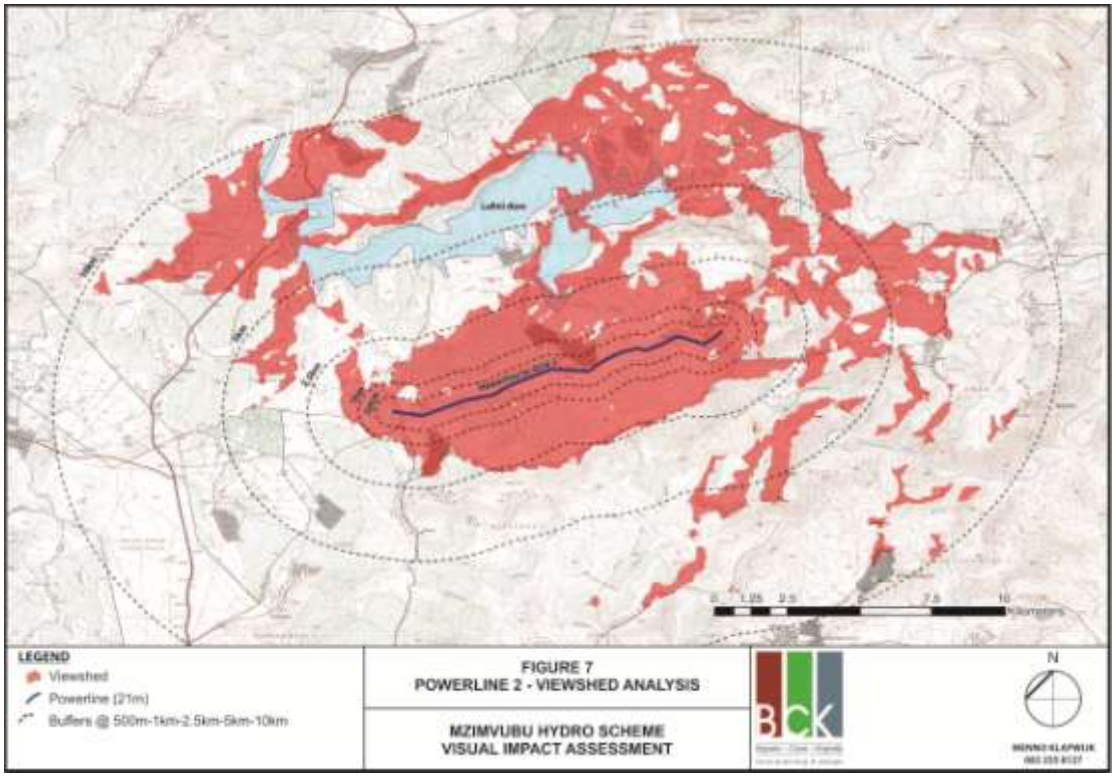



**Figure 7: Powerline 2: Viewshed**

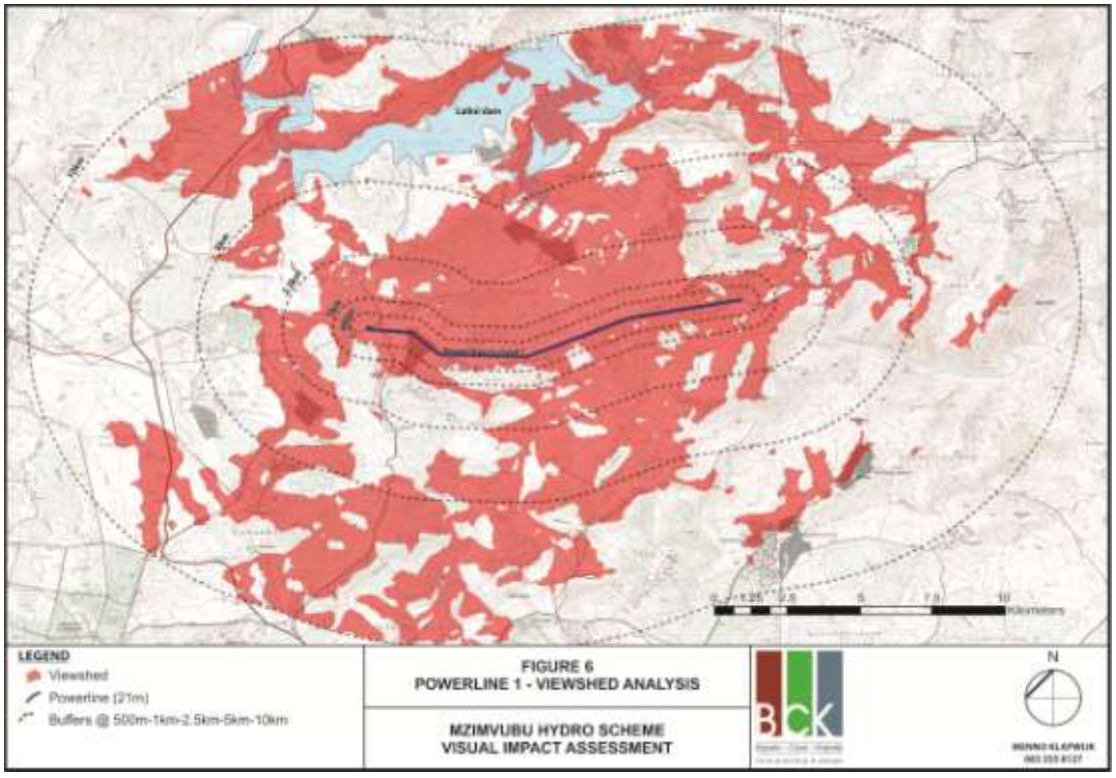



**Figure 8: Powerline 3: Viewshed**

Notwithstanding the low to moderate VAC, the area has already been modified by human interaction in the form of settlements, roads and arable agriculture and is thus able to visually accommodate the industrial nature of the lines

**Landscape Character**

The hills and ridges exhibits a well-defined and vivid sense of spatial definition with a moderate scenic quality due to the combination of low gentle valleys, open grasslands and the scattered settlements. The character of the landscape can be regarded as rural agriculture predominantly stock grazing and subsistence farming.

**Implications for the Project**

The introduction of a powerline within this landscape will alter the character considerably due to the size and scale of it. The powerline will considerably alter the sense of place and Genius Loci of the study area. However, the change in character is not considered to be significantly negative.

The introduction of this element in the landscape has the potential to promote tourist-based enterprises that rely on the high scenic quality as the basis for their business, especially with the Tsitsa Falls in close proximity.

### 5.1.4 Irrigation Scheme

**Topography**

The areas earmarked for irrigation are mainly in the Tsolo area situated roughly between the two dam sites. About 2 450 ha of the 2 900 ha of the high potential land suitable for irrigated agriculture are in the Tsolo area and the rest near the proposed Ntabelanga Dam and along the river, close to the villages of Machibini, Nxotwe, Culunca, Ntshongweni, Caba, Kwatsha and Luxeni.

The area around Tsolo consists of gentle rolling hills much of which has been previously terraced farmed **(Figure 9: Tsolo Irrigation Scheme)**. Sections are adjacent to drainage lines while others are on sloped terrain. The areas around the Ntabelanga Dam are mainly on flatter lying land adjacent to the edge of the dam and adjacent to the river downstream of the dam.

**Implications for the Project**

The flatter lying land proposed for irrigation assists in containing the visibility of the irrigated lands due to the lack of relief and the angle of exposure. The terraced areas are more prone to exposure which increases the visual area of influence

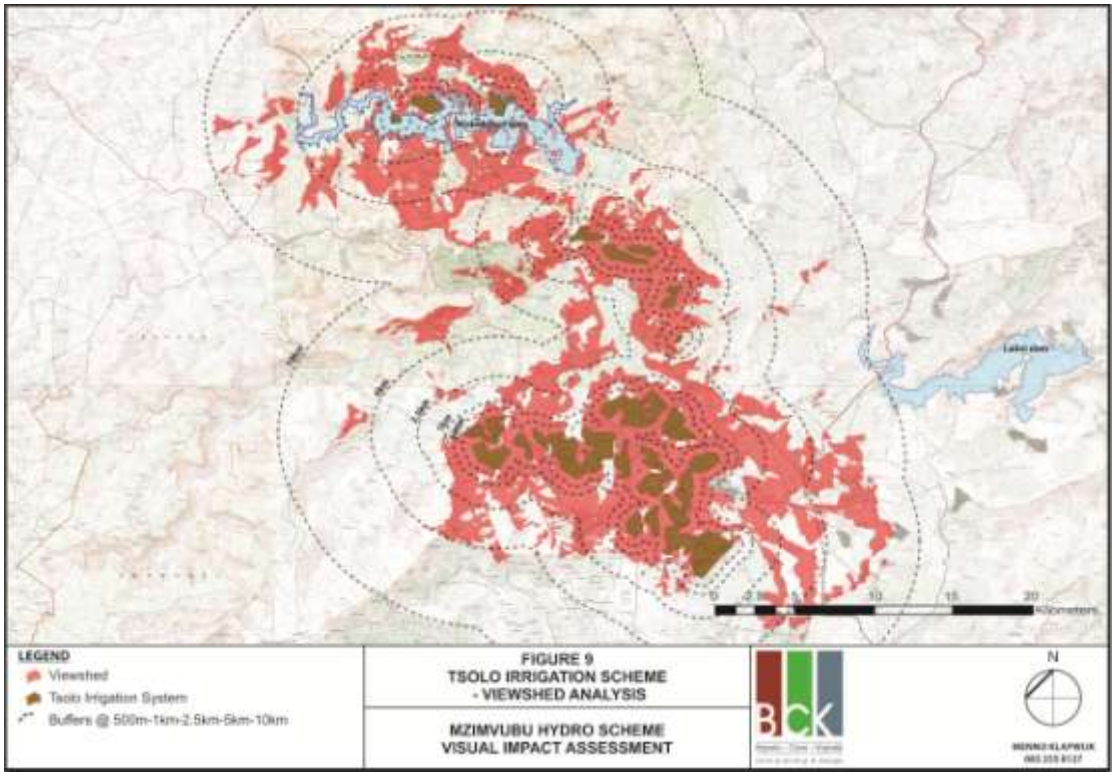



**Figure 9: Tsolo Irrigation Scheme**

### Vegetation Cover

The Open Grassland landscape type vegetation for most of the area has been modified or disturbed by previous farming activities mostly in the form of subsistence farming, ploughing or heavy overgrazing. Some of the areas on slopes have been previously terraced. The vegetation is open, uniform in texture and stark resulting in a visually open and exposed landscape.

### Implications for the Project

The uniformly textured grassland vegetation will visually contrast significantly with the irrigated lands making them more visible in the landscape. The low vegetation height does not assist in screening them nor does it assist in blending them with the landscape. The lack of a diverse vegetation cover limits the opportunity to blend the lands visually with the landscape and will leave them visually exposed.

**Visibility**

Views in the Tsolo area are limited in the west to between 500 m and 5 km and between 1 and 8 km in the east. Views along the Tsitsa River area are generally between 1 and 2.5 km while the area around the Ntabelanga Dam is visible between 2.5 and 6.5 km **(Figure 9: Tsolo Irrigation Scheme: Viewshed)**.

Critical views are from the R 396 that links the N2 with Maclear through Tsolo. Critical views also include the surrounding local villages such as Tsolo, Bantubabi, Prince, Duka, KuGubengxa, St. Cuthberts and Godini in the Tsolo area; the village of Machibini along the Tsitsa River area and the villages of eLugolweni. Coba Vale, Coba, Luxeni and Mpetsheni in the Ntabelanga Dam area.

**Implications for the Project**

Although the irrigated areas are close to critical views from the villages, and well within the viewsheds the impact is considered low as these areas are mostly existing arable lands that are being converted to irrigation and as such the visual image will not significantly change.

**Landscape Diversity**

Landscape diversity within the viewshed is similar to the dam study sites and is primarily based on the topographical features and human interventions as the vegetation, namely grasslands, is relatively uniform in texture and height.

The landscape exhibits a great degree of horizontal and vertical scale due to the surrounding hills and ridges that provide a landscape in proportion to the scale of the patches of irrigated lands.

The study area is already modified by human activity such as the various scattered settlements, roads and ploughed, terraced lands which add to a more diverse landscape.

**Implications for the Project**

The low diversity of the open and uniform vegetation together with the diversity of the human activity and the rising landforms adds towards a low to moderate diversity

The visual diversity within this Grassveld landscape biome will result in a low to moderate VAC. The hills and ridges together with the scattered settlements display a slightly higher visual diversity due to the more diverse topography and the odd patches of trees. However, this still does not provide sufficient diversity and will still result in any large scale structure to be highly visible due to the lack of screening and the high visual contrast.

Notwithstanding the low to moderate VAC, the area has already been modified by human interaction in the form of settlements, roads and arable agriculture and is thus able to visually accommodate the industrial nature of the lines

**Landscape Character**

The hills and ridges exhibit a well-defined and vivid sense of spatial definition with a moderate scenic quality due to the combination of low gentle valleys, open grasslands and the scattered settlements. The character of the landscape can be regarded as rural agriculture, predominantly stock grazing and subsistence farming.

**Implications for the Project**

The introduction of irrigation to these lands within this landscape will not alter the character considerably due to the similar size and scale of the existing arable lands. The irrigated lands will not considerably alter the sense of place and Genius Loci of the study area. However, the slight change in character is not considered to be significantly negative.

### 5.1.5 Access Roads

**Topography**

Access roads in and around the dam sites will require re-alignment due to inundation by the proposed dams. The roads traverse mostly open rolling and undulating topography which is formed by the lower foothills of the Eastern Cape Drakensberg.

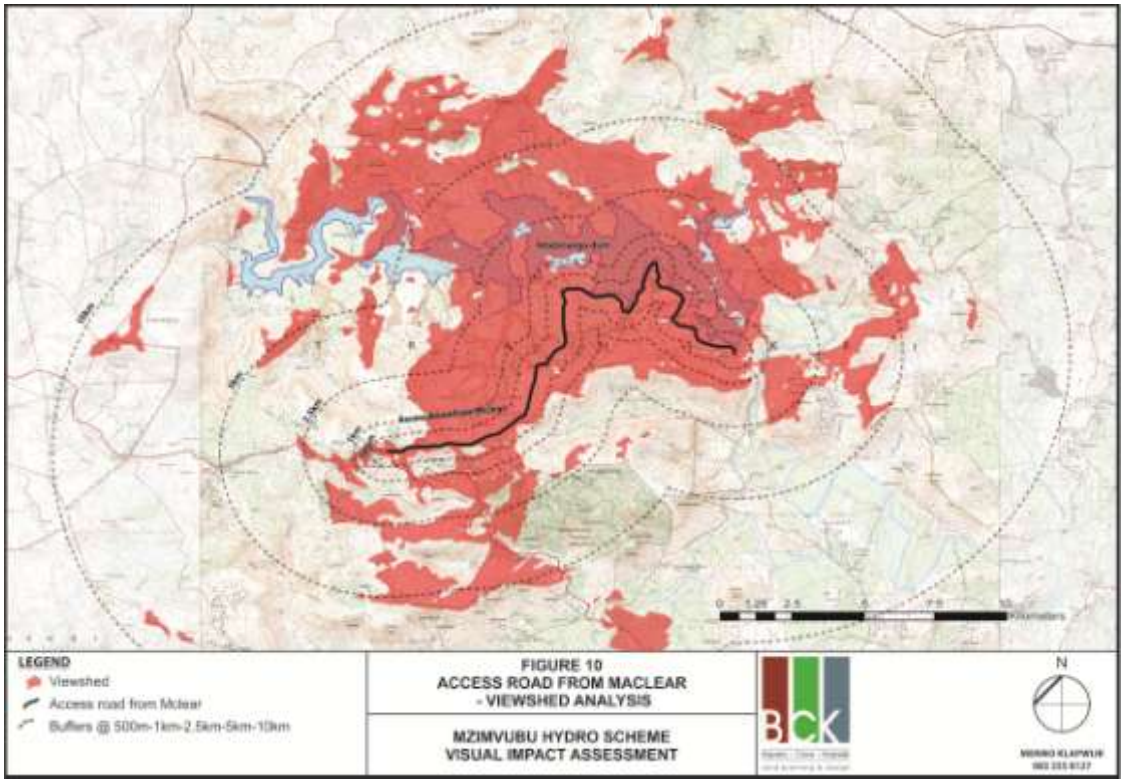



**Figure 10: Access road from Maclear**

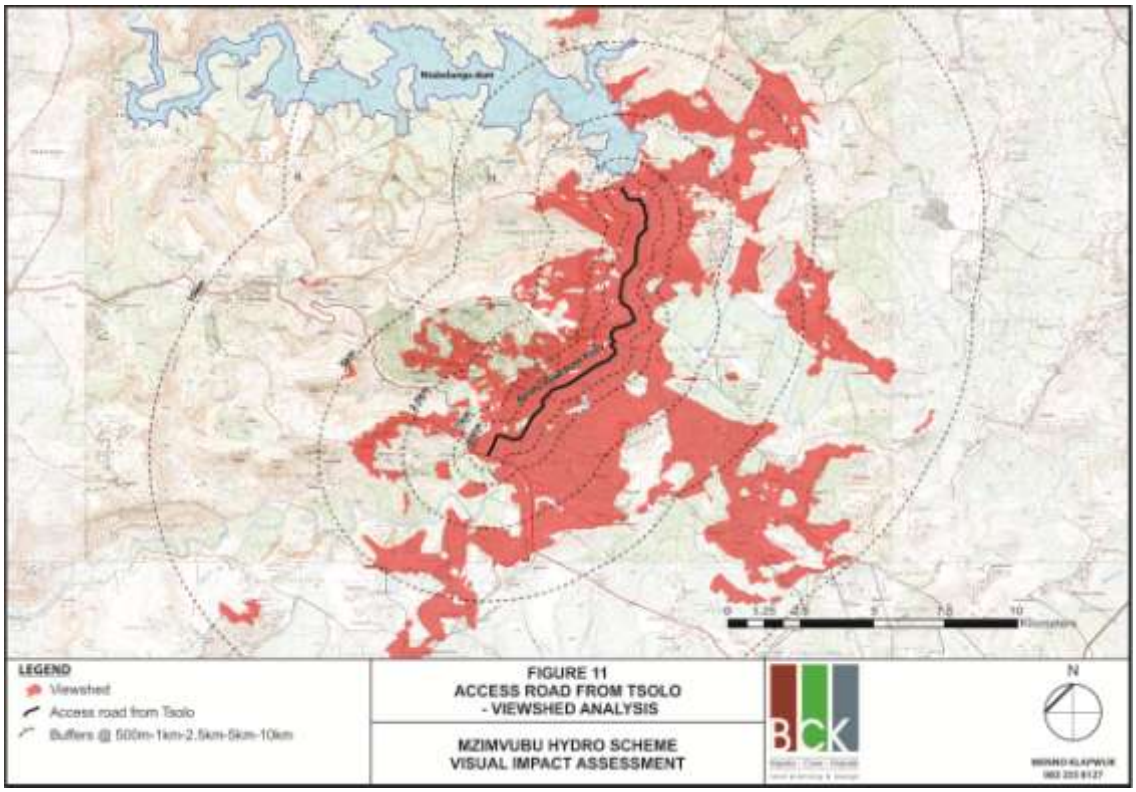


**Figure 11: Access Road from Tsolo**

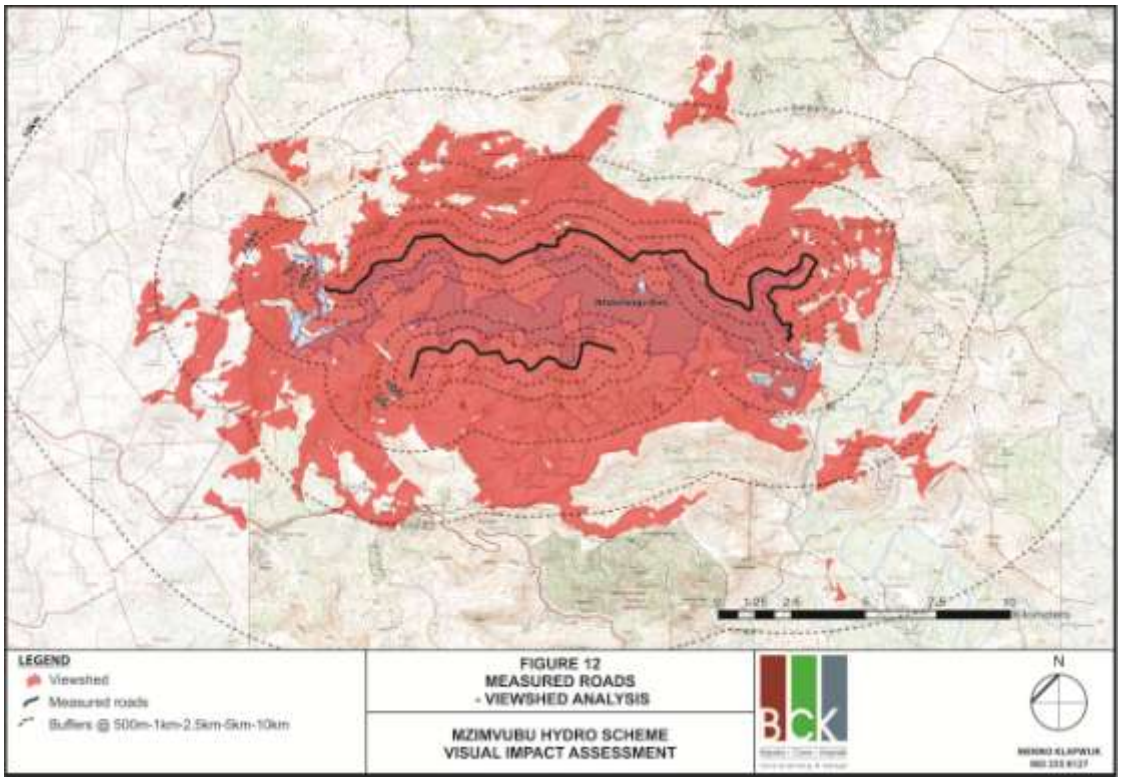



**Figure 12: Measured Roads**

### Implications for the Project

Due to the nature of the landscape the roads rise up over hills and ridges from where they are visible in the landscape from the surrounding hills. The form of the landscape does not allow for long stretches of road that are straight and angular but introduces mostly curves which blend visually and are sympathetic with the environment.

### Vegetation Cover

The vegetation for most of the area is open grassland or has been modified or disturbed by previous farming activities mostly in the form of subsistence farming, ploughing or heavy overgrazing. Some of the areas on slopes have been previously terraced. The cover is open and uniform in texture resulting in a visually open and exposed landscape.

### Implications for the Project

The uniformly textured grassland vegetation will visually contrast significantly with the roads making them more visible in the landscape. The low vegetation height does not assist in screening them nor does it assist in blending them with the landscape. The lack of a diverse vegetation cover limits the opportunity to blend the roads visually with the landscape and will leave them visually exposed.

**Visibility**

Views in the Maclear road extend northwards for up to 9 km and 1.5 km to the south with intermittent views up to 5 km. **(Figure 10: Access Road from Maclear: Viewshed)**.The road from Tsolo will be visible northwards up to 1 km with intermittent views up to 4 km. **(Figure 11: Access Road from Tsolo: Viewshed)**.The measured roads around the Ntabelanga dam are visible up to 2.5 km to the north and up to 5 km to the south. **(Figure 12: Measured Roads: Viewshed).**

Critical views are from the R 396 that links the N2 with Maclear through Tsolo. Critical views also include the surrounding local villages such as KwaNogemani, Zilandana, KwaMsobomva, Kombulu, Bongweni, Sinxago, KuQulungashe, Sinqungweni, Sinqungini and Mcedu.

**Implications for the Project**

It will not be possible to adequately screen the roads from the surrounding areas due to the short grasslands that do not offer a screening function.

**Landscape Diversity**

Landscape diversity within the viewsheds is based primarily on the topographical features and human interventions such as rural settlements, ploughed and terraced lands and a network of access roads. This diversity is tempered by the vegetation, namely grasslands that is relatively uniform in texture and height.

The roads traverse an open rolling landscape that is already modified by human activity such as the various scattered rural settlements, roads and ploughed, terraced lands which add to a more diverse landscape.

**Implications for the Project**

The low diversity of the open and uniform vegetation together with the diversity of the human activity and the rising landforms adds towards a low to moderate diversity.

This diversity does allow some form of visual compatibility which incorporates the roads in the landscape as the introduction of new roads is not visually out of place and in contrast with the existing sense of place

Notwithstanding the low to moderate VAC, the area has already been modified by human interaction in the form of settlements, existing roads and arable agriculture and is thus able to visually accommodate the roads.

**Landscape Character**

The hills and ridges exhibit a well-defined and vivid sense of spatial definition with a moderate scenic quality due to the combination of low gentle valleys, open grasslands and the scattered settlements. The character of the landscape can be regarded as rural agriculture, predominantly stock grazing and subsistence farming.

**Implications for the Project**

The introduction of new access roads will not detract from this sense of place as images of roads already exist within this landscape.

# 6. THE VISUAL ASSESSMENT

## 6.1 THE VISUAL ANALYSIS

This section describes the aspects which have been considered in order to determine the intensity of the visual impact on the area. The criteria includes the area from which the project can be seen (the viewshed), the viewing distance, the capacity of the landscape to visually absorb structures and forms placed upon it (the visual absorption capacity), and the appearance of the project from important or critical viewpoints.

### 6.1.1 The Viewshed

The viewshed is a topographically defined area which includes all possible observation sites from which the project will be visible. The boundary of the viewshed, which connects high points in the landscape, is the boundary of possible visual impact (Alonso, et al, 1986). Local variations in topography and man-made structures would cause local obstruction of views. The viewshed, based on the GIS assessment and fieldwork, extends for the main part from 1 km to greater than 20 km. (**Figures 3-12**).

### 6.1.2 The Viewing Distance

The visual impact of an object in the landscape diminishes at an exponential rate as the distance between the observer and the object increases (Hull and Bishop, 1988).

Thus, the visual impact at 1000 metres would be approximately a quarter of the impact as viewed from 500 metres. Consequently, at 2000 metres, it would be one sixteenth of the impact at 500 metres. The view of the project components would appear so small from a distance of 5000 metres or more that the visual impact at this distance is insignificant. On the other hand the visual impact of the project components from a distance of 500 metres or less would be at its maximum (**Figure 13**).

### 6.1.3 Critical Views

Views identified as being critical have been discussed under Section 5. These have been overlaid on the viewshed to determine the extent of these within the viewing zones radiating out from the project components. In summary the critical views are those from the surrounding villages, the main roads and the Tsitsa Falls.

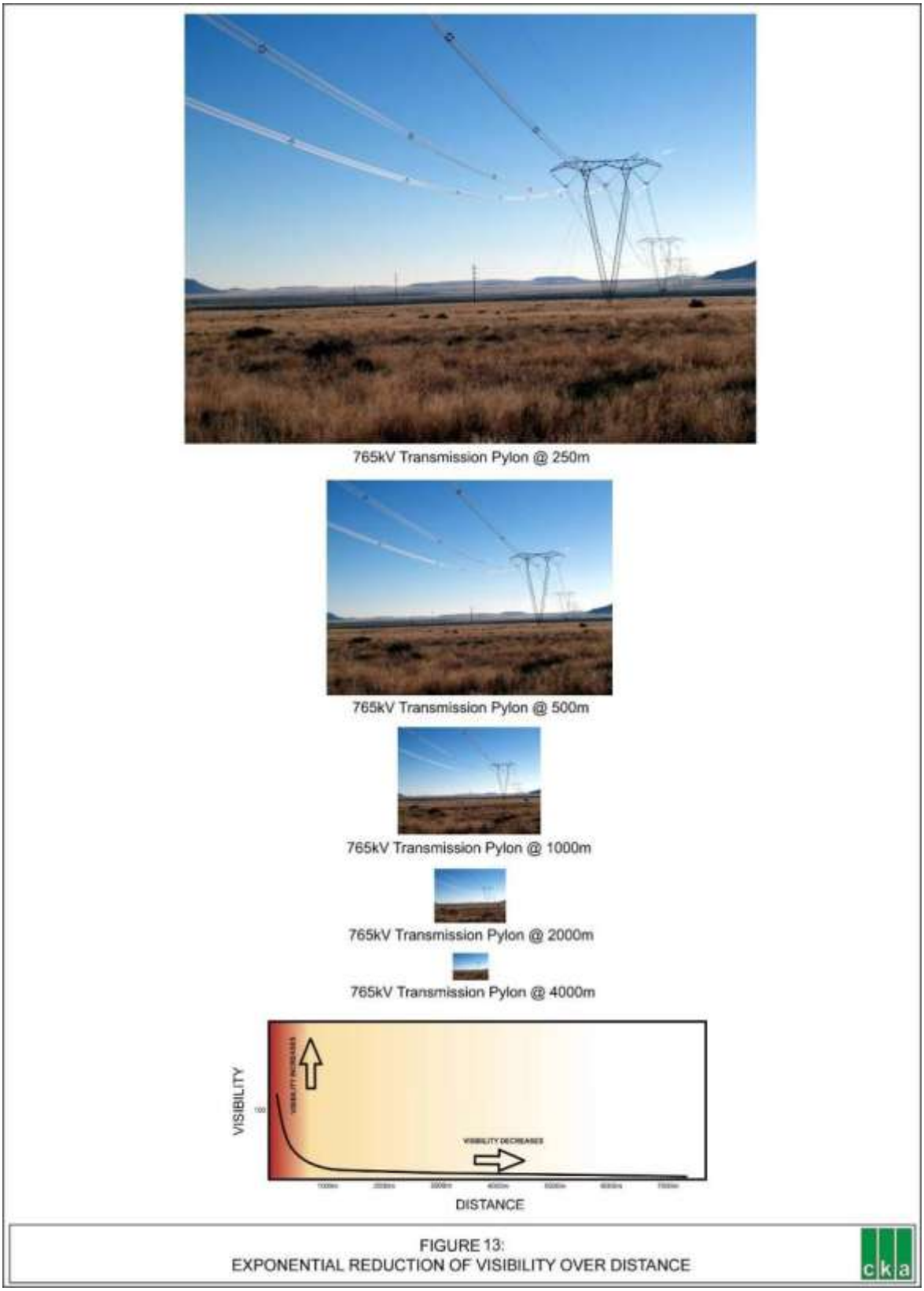



**Figure 13: An Example of Exponential Reduction of Visibility over Distance**

### 6.1.4 The Visual Absorption Capacity

The Visual Absorption Capacity (VAC) is a measure of the landscape's ability to visually accept / accommodate or embrace a development. Areas which have a high visual absorption capacity are able to easily accept objects so that their visual impact is less noticeable. Conversely areas with low visual absorption capacity will suffer a higher visual impact from structures imposed on them. In this case the VAC has been defined as a function of three factors.

The VAC was determined, based on the author's field experience, taking the following into account: **(Table 9)**

- Slope
- Visual pattern (landscape texture) with regard to vegetation and structures
- Vegetation height

**Table 9: Visual Absorption Capacity Factors and their Numerical Values**

| **VAC Factor** | | **Categories** | | |
|---|---|---|---|---|
| Slope | Range<br>Numerical Value<br>VAC | 0-3 %<br>3<br>Low | 3-6 %<br>2<br>Moderate | > 6 %<br>1<br>High |
| Vegetation Height | Range<br>Numerical Value<br>VAC | < 1 m<br>3<br>Low | 1-6 m<br>2<br>Moderate | >6 m<br>1<br>High |
| Visual Pattern | Description<br>Numerical Value<br>VAC | Uniform<br>3<br>Low | Moderate<br>2<br>Moderate | Diverse<br>1<br>High |

It is therefore concluded that the VAC can be regarded as:

It has a combined rating of 9 which equates with a **Low VAC** due to the open landscape and grassland. Areas within the deeper valleys have a moderate VAC due the steep topography

This implies that the areas with a **Low** VAC are inherently unable to visually accommodate or accept the visual change made by the proposed development.

The Visual Assessment Criteria (intensity, significance and intensity ratings) are specified in **Tables 10 to 12**.

**Table 10: Visual Assessment Criteria - Intensity Rating**

| **Visual Assessment Criteria** | **Intensity Rating** | | |
|---|---|---|---|
| | **High** | **Medium** | **Low** |
| Visibility from critical viewpoints | Highly visible within 1 km | Partially visible due to viewpoints approximately 2 km from the proposed development | Low visibility due to viewpoints approximately 3 km or more from the proposed development |
| Visibility from general surrounding landscape | Not obscured by natural landform | Partially obscured by landform | Mostly obscured by surrounding landform |
| Visual intrusion on landscape character and sense of place | Dominates sense of place | Partially influences sense of place | Has little effect on sense of place |
| Visual association with existing infrastructure development | Existing development is easily visible from proposed development (within 2 km) | Existing development is partially visible from proposed development (>2-<5 km) | Existing development is barely noticeable (>6 km) from the proposed development |
| Visibility from homesteads, conservation areas, local communities, villages and towns | Highly visible. Dominates view within 500 - 1 000 m | Visible but does not dominate view within range 1 000 - 2 500 m | Visible but are not obviously noticeable in the view > 2 500 m |

**Table 11: Visual Assessment Criteria - Significance Rating**

| Visual Assessment Criteria | Significance Rating | | |
|---|---|---|---|
| | **High** | **Medium** | **Low** |
| Visibility from existing viewpoints | Particularly interferes with scenic views from viewpoints | Partially interferes with scenic views from viewpoints | Components are too far from the viewpoints to interfere with scenic views |
| Visibility from general surrounding landscape | Compromises particularly scenic distant views of the landscapes | Particularly noticeable in scenic landscapes | Hardly noticeable in scenic landscapes |
| Visual intrusion on landscape character and sense of place | Compromises proclaimed conservation nature reserves and wilderness areas is within 500 - 1 000 m of a natural feature e.g. pans, mountains | Compromises particularly scenic landscape features e.g. coastal edge, undisturbed valleys; within 1 000 - 2 500 m | Compromises built up areas which exhibit an industrial character; is less visible, homestead greater than 2 500 m away |
| Visual association with existing infrastructure development | Where the development is within 200 m from existing infrastructure development | Where the development is within 1 000 m from existing infrastructure development | Where the development is further than 2 500 km from existing development. The visual intrusion is not associated with the other development |
| Visibility from homesteads, conservation areas, local communities, villages and towns | Where the visibility of the development interferes with the way of life such as a tourism enterprise and/or obstructs scenic distant views by being within 500 -1 | Where the visibility of the development interferes with the way of life such as a tourism enterprise and/or obstructs scenic distant views by being within 1 000 - | Where the visibility of the development interferes with the way of life such as a tourism enterprise and/or obstructs scenic distant views by being within 2 500 |

| Visual Assessment Criteria | Significance Rating | | |
|---|---|---|---|
| | **High** | **Medium** | **Low** |
| | 000 m of the community | 2 500 m of the homestead | m and greater of the homestead |

**Table 12: Visual Assessment Criteria - Intensity Rating**

**(This is the criteria against which the impact is assessed and is not the impact assessment)**

| CRITERIA | HIGH | MEDIUM | LOW |
|---|---|---|---|
| 1. Visibility | Very visible from many places beyond 5 000 m zone | Visible from within the 5 000 m zone but partially obscured by intervening objects. | Only partly visible within the 5 000 m zone and beyond due to screening by intervening objects. |
| 2. Genius Loci / Sense of Place | A particularly definite place with an almost tangible dominant ambience or theme. | A place which projects a loosely defined theme or ambience. | A place having little or no ambience with which it can be associated. |
| 3. Visual Quality | A very attractive setting with great variation and interest but no clutter. | A setting which has some aesthetic and visual merit. | A setting which has little aesthetic value. |
| 4. Visible Social Structures | Housing and/or other structures as a dominant visual element. | Housing and/or other structures as a partial visual element. | Housing and/or other structures as a minor visual element. |
| 5. Surrounding Landscape Compatibility | Ideally suits or matches the proposed development. | Can accommodate the proposed development without appearing totally out of place. | Cannot accommodate proposed development without it appearing totally out of place visually. |

| CRITERIA | HIGH | MEDIUM | LOW |
|---|---|---|---|
| | | | |
| 6. Character | The site or surrounding area exhibits a definite character. | The site or surrounding area exhibits some character. | The site or surrounding area exhibits little or no character. |
| 7. Scale | A landscape which has horizontal and vertical elements in high contrast to the human scale. | A landscape with some horizontal and vertical elements in some contrast to the human scale. | Where vertical variation is limited and most elements are related to the human and horizontal scale. |
| 8. Visual Absorption Capacity (VAC) | The ability of the landscape to easily accept visually a particular development because of its diverse landform, vegetation and texture. | The ability of the landscape to less easily accepts visually a particular development because of a less diverse landform, texture and vegetation. | The ability of the landscape not to visually accept a proposed development because of a uniform texture, flat slope and limited vegetation cover. |
| 9. View Distance | If uninterrupted view distances to the site are > 5 km. | If uninterrupted view distances are < 5 km but > 2.5 km. | If uninterrupted view distances are > 500 m and < 2 500 m. |
| 10. Critical Views | Views of the project are to be seen by many people passing on main roads and from prominent areas i.e. towns / urban areas / settlements, game farms, guest farms / lodges, hiking corridors, conservation areas, naturally scenic areas. | Some views of the project from surrounding towns / urban areas / settlements, main roads and game farms / lodges / conservation areas, naturally scenic areas. | Limited views to the project from towns / urban areas / settlements, main roads and game farms / lodges / conservation areas, naturally scenic areas. |

### 6.1.5 Cumulative Impacts

Visual impacts have been assessed in terms of the impact the development will have on the visual environment. Visual assessment is a component of the human aesthetics and is considered part of a suite of social impacts such as noise and sense of place which together may result in a higher cumulative impact than if it were read in isolation. This study assesses only the visual impacts.

As the proposed development is located on rural agricultural land and can be regarded as a "greenfields" area, there is no cumulative impact as it is not adding to an existing development network within the site boundaries. It can, conversely, be argued that there is a cumulative impact of 100 % as the proposed development is entirely new of which there previously was not one. However, visually the development is connected to external developments such as the Eskom transmission lines, existing villages, roads and agricultural lands that skirt and traverse the affected area in which the cumulative impact increases. This increase cannot be measured empirically. However, it can be assumed that, as visual impacts reduce exponentially with distance, conversely doubling the size and volume of a development may increase the impact exponentially.

Notwithstanding the increase in cumulative impact, it is often preferable to place new such structures alongside existing such structures as these areas are already disturbed in the belief that the impact is less than if the same impact was exerted on an area that has not previously been impacted upon.

# 7. IMPACT ASSESSMENT FOR DAMS AND ASSOCIATED WATER INFRASTRUCTURE

This Chapter presents the findings of the environmental impact assessment for the dams and associated activities (DEA Ref no. 14/12/16/3/3/2/677).

The activities assessed under this chapter are listed below:

- The Ntabelanga and Lalini Dams.

## 7.1 CONSTRUCTION PHASES

### 7.1.1 Aesthetics Ntabelanga Dam

Alteration to the sense of place
The impact assessment for Ntabelanga Dam during construction is given in **Table 9**.

Recommended mitigation:

- Rehabilitate all construction scarring outside dam basin.
- Concentrate where possible all borrow areas and quarries below the full supply line.
- Final mitigation will be incorporated into the EMP.

**Table 9: Impact Table Ntabelanga Dam – Construction Phase**

| **Aesthetics** | Extent | Duration | Intensity | Potential for irreplaceable loss of resources | Probability | Confidence | Significance |
|---|---|---|---|---|---|---|---|
| **Proposed Project with Ntabelanga Dam** | | | | | | | |
| Without Mitigation | Regional | Long term | Very high | High | Definite | Medium | Medium-Low |
| With Mitigation | Regional | Long term | Very high | High | Definite | Medium | Medium-Low |
| Cumulative Impact –the impact on the sense of place is regarded as high in that the dam will visually alter the entire valley. However, the significance is considered to be medium low in that a water body is usually regarded as having a high positive aesthetical appeal. | | | | | | | |

### 7.1.2 Aesthetics Lalini Dam

Alteration to the sense of place
The impact assessment for Lalini Dam during construction is given in **Table 10**.

Recommended mitigation:

- Rehabilitate all construction scarring outside dam basin.
- Concentrate where possible all borrow areas and quarries below the full supply line.
- Final mitigation will be incorporated into the EMP.

**Table 10: Impact Table Lalini Dam Lines – Construction Phase**

| **Aesthetics** | Extent | Duration | Intensity | Potential for irreplaceable loss of resources | Probability | Confidence | Significance |
|---|---|---|---|---|---|---|---|
| **Proposed Project with Lalini Dam size 1 (preferred alternative)** | | | | | | | |
| Without Mitigation | Regional | Long term | Very high | High | Definite | Medium | Medium-Low |
| With Mitigation | Regional | Long term | Very high | High | Definite | Medium | Medium-Low |
| **Proposed Project with Lalini Dam size 2** | | | | | | | |
| Without Mitigation | Regional | Long term | Very high | High | Definite | Medium | Medium-Low |
| With Mitigation | Regional | Long term | Very high | High | Definite | Medium | Medium-Low |
| **Proposed Project with Lalini Dam size 3** | | | | | | | |
| Without Mitigation | Regional | Long term | Very high | High | Definite | Medium | Medium-Low |
| With Mitigation | Regional | Long term | Very high | High | Definite | Medium | Medium-Low |
| Cumulative Impact – the cumulative impact on the sense of place is regarded as high in that the dam will visually alter the entire valley. However, the significance is considered to be medium low in that a water body is usually regarded as having a high positive aesthetical appeal. The size of impoundment will not make a significant affect the change to the sense of place. | | | | | | | |

## 7.2 OPERATION PHASE

### 7.2.1 Aesthetics Ntabelanga Dam

Alteration to sense of place

The impact assessment for Ntabelanga Dam during operation is given in **Table 11**.

Recommended mitigation:

None

**Table 11: Impact Table Ntabelanga Dam - Operation Phase**

| **Aesthetics** | Extent | Duration | Intensity | Potential for irreplaceable loss of resources | Probability | Confidence | Significance |
|---|---|---|---|---|---|---|---|
| **Proposed Project with Ntabelanga Dam** | | | | | | | |
| Without Mitigation | Regional | Long term | Very high | High | Definite | Medium | Medium-Low |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| With Mitigation | Regional | Long term | Very high | High | Definite | Medium | Medium-Low |
| Cumulative Impact –the impact on the sense of place is regarded as high in that the dam will visually alter the entire valley. However, the significance is considered to be medium low in that a water body is usually regarded as having a high positive aesthetical appeal. | | | | | | | |

### 7.2.2 Aesthetics Lalini Dam

Alteration to sense of place
The impact assessment for Lalini Dam during operation is given in **Table 12**.

Recommended mitigation:
None

**Table 12: Impact Table Lalini Dam - Operation Phase**

| **Aesthetics** | Extent | Duration | Intensity | Potential for irreplaceable loss of resources | Probability | Confidence | Significance |
|---|---|---|---|---|---|---|---|
| **Proposed Project with Lalini Dam size 1 (preferred alternative)** | | | | | | | |
| Without Mitigation | Regional | Long term | Very high | High | Definite | Medium | Medium-Low |
| With Mitigation | Regional | Long term | Very high | High | Definite | Medium | Medium-Low |
| **Proposed Project with Lalini Dam size 2** | | | | | | | |
| Without Mitigation | Regional | Long term | Very high | High | Definite | Medium | Medium-Low |
| With Mitigation | Regional | Long term | Very high | High | Definite | Medium | Medium-Low |
| **Proposed Project with Lalini Dam size 3** | | | | | | | |
| Without Mitigation | Regional | Long term | Very high | High | Definite | Medium | Medium-Low |
| With Mitigation | Regional | Long term | Very high | High | Definite | Medium | Medium-Low |
| Cumulative Impact – the impact on the sense of place is regarded as high in that the dam will visually alter the entire valley. However, the significance is considered to be medium low in that a water body is usually regarded as having a high positive aesthetical appeal. The size of impoundment will not make a significant affect the change to the sense of place. | | | | | | | |

# 8. IMPACT ASSESSMENT FOR ELECTRICITY GENERATION AND DISTRIBUTION INFRASTRUCTURE

This Chapter presents the findings of the environmental impact assessment for the electricity generation and distribution related activities (DEA Ref no. 14/12/16/3/3/2/678).

The activities assessed under this chapter are listed below:

- A 18.5km powerline from the Lalini Dam tunnel.

## 8.1 CONSTRUCTION PHASES

### 8.1.1 Aesthetics Transmission Lines Lalini Dam

Alteration to sense of place

The impact assessment for the transmission lines during construction is given in **Table 13**.

- Recommended mitigation: Alternative 1 (closest to the Tsitsa Falls) should be avoided as it will have a high negative impact on the sense of place of the Tsitsa Falls and associated valley.
- It is recommended that Alternative 3 (furthest from the Falls) be selected but re-aligned to drop below the ridge line into the adjacent valley where it will have the valley sides to provide a backdrop and reduce the silhouette image against the skyline.
- Final mitigation will be incorporated into the EMP.

**Table 13: Impact Table Transmission Lines – Construction Phase**

| **Aesthetics** | Extent | Duration | Intensity | Potential for irreplaceable loss of resources | Probability | Confidence | Significance |
|---|---|---|---|---|---|---|---|
| **Proposed Powerline 3** | | | | | | | |
| Without Mitigation | Regional | Long term | High | Medium | Definite | Medium | Medium-Low |
| With Mitigation | Regional | Long term | High | Medium | Definite | Medium | Low |
| **Proposed Powerline 2** | | | | | | | |
| Without Mitigation | Regional | Long term | High | Medium | Definite | Medium | Medium- |
| With Mitigation | Regional | Long term | High | Medium | Definite | Medium | Medium- |
| **Proposed Powerline 1** | | | | | | | |
| Without Mitigation | Regional | Long term | High | High | Definite | Medium | Very High |
| With Mitigation | Regional | Long | High | High | Definite | Medium | Very High |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | term | | | | | |
| Cumulative Impact –the cumulative impact is high as this introduces a transmission into an environment that there previously had not been one. he impact on the sense of place is by Alternative 3 is regarded as high in that the transmission line and associated infrastructure will visually alter the entire valley and is of very high significance due to the impact on the nearby Tsitsa Falls. The significance of Alternative 2 is considered to be medium in that the will still be an impact on the valley bottom but it does not impact on the Tsitsa Falls. | | | | | | | |

## 8.2 OPERATION PHASE

### 8.2.1 Aesthetics

Alteration to sense of place

The impact assessment for the transmission lines during operation is given in **Table 14**.

- Recommended mitigation: Alternative 1 should be avoided as it will have a high negative impact on the sense of place of the Tsitsa Falls and associated valley.
- It is recommended that Alternative 3 be selected but re-aligned to drop below the ridge line into the adjacent valley where it will have the valley sides to provide a backdrop and reduce the silhouette image against the skyline.
- Final mitigation will be incorporated into the EMP.

**Table 14: Impact Table Transmission Lines - Operation Phase**

| **Aesthetics** | Extent | Duration | Intensity | Potential for irreplaceable loss of resources | Probability | Confidence | Significance |
|---|---|---|---|---|---|---|---|
| **Proposed Powerline 3** | | | | | | | |
| Without Mitigation | Regional | Long term | High | Medium | Definite | Medium | Medium-Low |
| With Mitigation | Regional | Long term | High | Medium | Definite | Medium | Low |
| **Proposed Powerline 2** | | | | | | | |
| Without Mitigation | Regional | Long term | High | Medium | Definite | Medium | Medium- |
| With Mitigation | Regional | Long term | High | Medium | Definite | Medium | Medium- |
| **Proposed Powerline 1** | | | | | | | |
| Without Mitigation | Regional | Long term | High | High | Definite | Medium | Very High |
| With Mitigation | Regional | Long term | High | High | Definite | Medium | Very High |
| Cumulative Impact –the cumulative impact is high as this introduces a transmission into an environment that there previously had not been one. the impact on the sense of place is by Alternative 1 is regarded as high in that the transmission line and associated infrastructure will visually alter the entire valley and is of very high significance due to the impact on the nearby Tsitsa Falls. The significance of Alternative 2 is considered to be medium in that the will still be an impact on the valley bottom but it does not impact on the Tsitsa Falls. | | | | | | | |

# 9. IMPACT ASSESSMENT FOR ROADS INFRASTRUCTURE

This Chapter presents the findings of the environmental impact assessment for the road infrastructure (DEA Ref no. 14/12/16/3/3/1/1169).

The activities included under this chapter are listed below:

- Upgrading and relocation of roads and bridges;
- Construction of new access roads around the Ntabelanga and Lalini Dam sites.

## 9.1 CONSTRUCTION PHASES

### 9.1.1 Aesthetics

Alteration to sense of place

The impact assessment for road construction is given in **Table 15**.

Recommended mitigation:

- Final mitigation will be incorporated into the EMP.

**Table 15: Impact Table: Access Roads - Construction Phase**

| **Aesthetics** | Extent | Duration | Intensity | Potential for irreplaceable loss of resources | Probability | Confidence | Significance |
|---|---|---|---|---|---|---|---|
| **Proposed Access Road from Maclear** | | | | | | | |
| Without Mitigation | Regional | Long term | Medium | Medium | Definite | Medium | Medium-Low |
| With Mitigation | Regional | Long term | Medium | Medium | Definite | Medium | Medium-Low |
| **Proposed Access Road from Tsolo** | | | | | | | |
| Without Mitigation | Regional | Long term | Medium | Medium | Definite | Medium | Medium-Low - |
| With Mitigation | Regional | Long term | Medium | Medium | Definite | Medium | Medium-Low - |
| **Proposed Measured Roads** | | | | | | | |
| Without Mitigation | Regional | Long term | Medium | Medium | Definite | Medium | Medium-Low |
| With Mitigation | Regional | Long term | Medium | Medium | Definite | Medium | Medium-Low |
| Cumulative Impact –the cumulative impact is medium. It is not considered that the road upgrades will add to the existing impact of road infrastructure from a visual point of view. Falls. | | | | | | | |

## 9.2 OPERATION PHASE

### 9.2.1 Aesthetics

Alteration to sense of place

The impact assessment during operation of roads is given in **Table 16**.

Recommended mitigation:

- Final mitigation will be incorporated into the EMP.

**Table 16: Access Roads - Operation Phase**

| **Aesthetics** | Extent | Duration | Intensity | Potential for irreplaceable loss of resources | Probability | | Confidence | Significance |
|---|---|---|---|---|---|---|---|---|
| | **Proposed Access Road from Maclear** | | | | | | | |
| Without Mitigation | Regional | Long term | Medium | Medium | Definite | | Medium | Medium-Low |
| With Mitigation | Regional | Long term | Medium | Medium | Definite | | Medium | Medium-Low |
| | **Proposed Access Raid from Tsolo** | | | | | | | |
| Without Mitigation | Regional | Long term | Medium | Medium | Definite | | Medium | Medium-Low - |
| With Mitigation | Regional | Long term | Medium | Medium | Definite | | Medium | Medium-Low - |
| | **Proposed Measured Roads** | | | | | | | |
| Without Mitigation | Regional | Long term | Medium | High | Definite | | Medium | Medium-Low |
| With Mitigation | Regional | Long term | Medium | High | Definite | | Medium | Medium-Low |
| Cumulative Impact | The cumulative impact is medium. It is not considered that the road upgrades will add to the existing impact of road infrastructure from a visual point of view. Falls. | | | | | | | |

# 10. IMPACT ASSESSMENT FOR THE NO PROJECT ALTERNATIVE

## 10.1 NO PROJECT ALTERNATIVE

The no project alternative was not specifically evaluated as this alternative would maintain the visual status quo. In other words there would be no change to the visual environment and hence no impact

# 11. CONSULTATION PROCESS

## 11.1 CONSULATION PROCESS FOLLOWED

Engagement with Interested and Affected Parties (I&APs) forms an integral component of the EIA process. I&APs have an opportunity at various stages throughout the EIA process to gain more knowledge about the proposed project, to provide input into the process and to verify that their issues and concerns have been addressed.

The proposed project was announced in April 2014 to elicit comment from and register I&APs from as broad a spectrum of public as possible. The announcement was done by the following means:

- The distribution of Background Information Documents (BIDs) in English and IsiXhosa;
- Placement of site notices in the project area and Municipal offices (Tsolo and Qumbu);
- Placement of advertisements in one regional (The Herald) and two local (Daily Dispatch and the Mthatha Fever) newspapers; and
- Publication of all available information on the DWA web site (www.dwa.gov.za/mzimvubu).

The Draft Scoping Report (DSR) was made available for a 30 day public comment period in May 2014. All documents were uploaded to the web, notification letters were sent out, the summary of the DSR was translated into isiXhosa, distributed to all registered stakeholders and hardcopies of the full report and translated summary report were available at public places. Additionally, three public meetings were held in the affected areas, Siqhungqwini, Tsolo and Lalini respectively. An Authorities Forum Meeting with all relevant authorities was held in East London on the 28 May 2014. This was to assist the authorities with commenting on the relevant documentation.

Comments received from stakeholders were captured in the Issues and Response Report (IRR) which formed part of the Final Scoping Report (FSR). The FSR was made available to the public for a 21 day comment period on 13 June 2014 and was submitted to the Department of Environmental Affairs (DEA). Comments received during the Final Scoping public comment period were compiled and an updated IRR was submitted to DEA on 8 July 204 and uploaded to the website. The FSR was accepted by DEA with certain conditions on 15 July 2014. Following this, a newsletter was compiled and translated to isiXhosa, explaining everything that has happened to date as well as what is to come. Both the English and isiXhosa versions were electronically distributed to all registered stakeholders and hardcopies were distributed by the local facilitators in the affected areas.

The Draft Environmental Impact Assessment Report (DEIR), its summary (translated into isiXhosa), the various specialist studies, the Environmental Management Programmes (one for the construction and operation of the project, and one for the

borrow areas and quarries) as well as the Water Use Licence Application will be made available for a period of thirty (30 days) for stakeholders to comment. Hardcopies will be made available at the same venues as the DSR and all documents will be uploaded to the website. The availability of these documents as well as the announcement of the upcoming public meetings in Siqhungqwini, Tsolo and Lalini will be advertised on the Eastern Cape SABC radio station, Umhlobo Wenene FM, which has a listenership of over 4 million people. Another Authorities Forum Meeting is scheduled for September 2014.

Stakeholder comments will be taken into consideration with the preparation of the final documents. The availability of the final documents will be announced prior to submission to the decision-making authority. Once a decision has been made by the DEA, all stakeholders will again be notified.

## 11.2 SUMMARY OF COMMENTS RECEIVED

I&APs did not raise any issues related to visual impacts.

# 12. OTHER INFORMATION REQUESTED BY THE AUTHORITY

No specific information related to visual impacts was requested by the authorities.

# 13. IMPACT STATEMENT

## 13.1 THE VISUAL IMPACT

The visual impact of the project in the landscape is a function of many factors or criteria (Table 6). The value ratings assigned to Table 5 refer to the impact a development could have on the visual elements that have been assessed. The impact ratings in Table 5 are assessed in terms of visual attributes and are represented in Tables 6 and 7. Some of the factors are measurable such as viewing distance, the visual absorption capacity of the surrounding landscape, and the scale of the surrounding environment and landform. Other factors are subjective viewpoints, which are extremely difficult to consistently categorise the opinion of the community. Studies in the USA have shown that professionals and environmental groups view modification of the natural landscape more negatively than other groups (McCool, *et al* 1986).

The critical appraisal of the visual impact of the project and associated works on the landscape is presented from the viewpoint of the informed citizen and professional. To the more economically depressed communities surrounding the proposed project, it may well be that they do not, or will not, object to the visual intrusion in their immediate environment. It may be that they welcome it since they could perceive it as a symbol of prosperity and personal advancement opportunity.

### 13.1.1 The View Distance

The visual impact of the project and associated structures will reduce exponentially as the viewer moves further away from the proposed structures (Hull and Bishop, 1988).

The project components will exert a high visual impact within the 1 000 m zone. The viewshed analysis (**Figures 3, 4 and 6 to 12**) has indicated that some of the components of the proposed development will be visible beyond the 10 000 m zone. However, due to topography visibility for the most part is restricted to less than 10 km with most views restricted to less than 5 km.

### 13.1.2 Critical Viewpoints

Critical views were determined during the field trips and from the 1:50 000 topographical maps and are discussed under Visibility – Section 5

Critical viewpoints are those areas from where most viewers would be exposed to the impact such as from public areas that rely on the aesthetic environment such as main roads, towns and villages as well as the Tsitsa Falls

### 13.1.3 Extent

The visual impact for construction of all project components will occur on a regional scale due to the extent of the development. However, the visual impact for the operational phase will extend as far as it can be seen, which will be generally less than 10 km.

The viewshed analysis suggests that theoretically some of the project components can at times be seen for over 10 - 20 km. Due to the exponential decrease in visibility, the visibility of these components should be insignificant beyond 10 km.

Due to the diminishing visibility, as a result of distance, the project components will exert an impact on a local rather than regional scale and should be regarded as **medium low**.

### 13.1.4 Duration

The duration of the impact during construction will be short term due to the relatively short construction period and the rehabilitation of the disturbed areas.

The duration of the impact during the operational phase will be permanent, in other words greater than 10 years and beyond the anticipated lifetime of the project, with the impact terminating only after a possible decommissioning of the project. The impact is therefore regarded as **High**

### 13.1.5 Intensity or Severity

The intensity of the visual impact during construction and operation will be high within the 500 – 1 000 m zone wherever the project components intrude in the critical viewpoints. However, the project should not greatly have an impact on the visual environment to such an extent that it will substantially affect important systems or communities.

The impact intensity for the Ntabelanga Dam is regarded as **Very High** as is that for the Lalini Dam. The intensity for Transmission Lines 2, 3 and 1 is **High**. The impact intensity for the Road from Maclear, the Road from Tsolo and the Measures roads is regarded as **Medium**.

### 13.1.6 Frequency of Occurrence

The frequency of occurrence of the impact is **continuous** while it remains visible, i.e. 24 hours. Although only the areas that could be lit at night such as the hydroelectric power stations will be for 24 hours.

### 13.1.7 The Probability of Occurrence

The construction and operational impact described is probable and can be regarded as **Definite**. It must be recognized, however, that much of this assessment is subjective and that it is not possible to empirically state that the impact will occur.

### 13.1.8 Reversibility

The impact on reversibility is regarded as having a **Medium** rating due to the fact that the vegetation and landforms can to some extent be recreated, restored or rehabilitated to the original form. This is dependent on how much disturbance to the natural vegetation takes place during construction. If the entire area is first stripped of vegetation and or topsoil and drainage channels altered prior to construction and operation the ability to reverse the impact becomes far more difficult or even impossible. The impact on reversibility for the dam sites is regarded as **Medium-High** due to the fact that inundation of these areas will have a permanent effect on the soil structure and land forms

### 13.1.9 Irreplaceable Loss of Resources

The impact on irreplaceable loss of resources for the Ntabelanga and Lalini Dams is regarded as **High.** The intensity for Transmission Lines 2, 3 is regarded as medium and for 1 is **High**. The impact intensity for the Road from Maclear, the Road from Tsolo and the Measures roads is regarded as **Medium**.

### 13.1.10 Consequence

The consequence is regarded as **Medium**.

### 13.1.11 Significance

The significance of the impact for the Ntabelanga Dam is regarded as **Medium-low** as is that for the Lalini Dam. The intensity for Transmission Lines 1 is **Low**, for Transmission Line 2 is **Medium** and for Transmission Line 3 is **Very High**. The impact significance for the Road from Maclear, the Road from Tsolo and the Measures roads is regarded as **Medium-Low**.

### 13.1.12 Nature of the Impact

The impact status is considered **negative** for the construction and operational phases.

### 13.1.13 Degree of Confidence in Predictions

The confidence is considered to be **medium** as the level of judgement is based generally on common sense, general knowledge, the author's field experience and the inherently subjective nature of this type of assessment.

# 14. CONCLUSION AND RECOMMENDATIONS,

The impact assessment was undertaken for only the dam sites, transmission lines, roads and irrigation areas. This study evaluated the visual impact of the Mzimvubu Water Scheme with a view to assessing its severity based on the author's experience, expert opinion and accepted techniques.

Based on the field observations and the studies herein and with the implementation of the mitigation measures, the following conclusions are made from a visual point of view:

All the project components will exert a negative influence on the visual environment. This is largely due to:

- high visibility of components within a relatively visually uniform landscape;
- impact on the visual quality and the sense of place;
- impact on selected critical views;
- the height and scale of the components could be dominant in the landscape;
- high visibility of construction and operation activity within large areas of uniform visual pattern;
- the low Visual Absorption Capacity of some of the settings which is attributable to:
  - undulating topography;
  - uniform and monotonous vegetation cover;
  - the lack of visual diversity.

The significance of the visual impact during construction and operation is regarded as:

- Ntabelanga Dam

  The significance of the visual impact is considered **medium-Low** (a rating of 2 on a scale of 1-5) during construction and operation.

- Lalini Dam

  The significance of the visual impact is considered **medium-Low** (a rating of 2 on a scale of 1-5) during construction and operation.

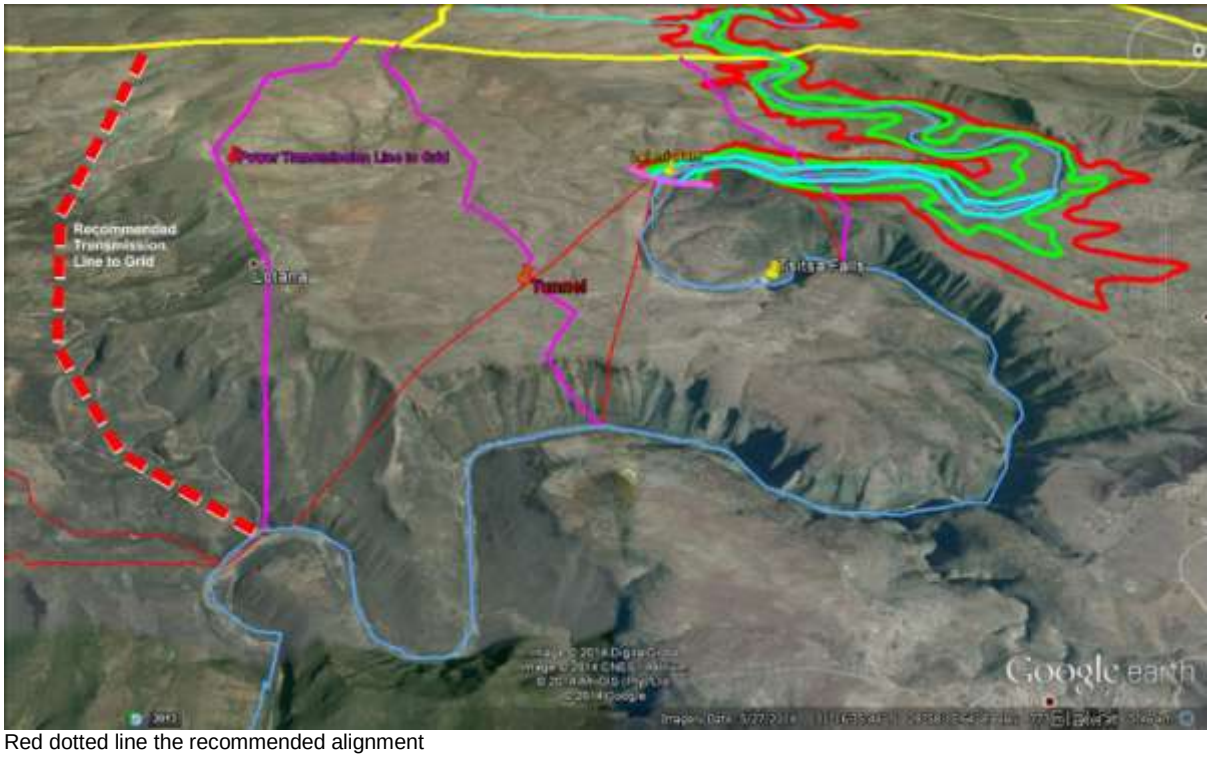
- Transmission Lines

  The significance of the visual impact of Transmission Line 3 is regarded as **Low** (a rating of 1 on a scale of 1-5), for transmission Line 2 is **Medium** (a rating of 3) and for Transmission Line 1 it is regarded as **Very High** (a rating of 5 on a scale of 1-5).

  Roads

  The impact significance for the Road from Maclear, the Road from Tsolo and the Measures roads is regarded as **Medium-Low** (a rating of **2** on a scale of 1-5).

In conclusion, based on the field observations and the studies herein, from a visual point of view, it is recommended that the alignment of Transmission Line 3 be realigned to avoid the ridge as set out in **Figure 14, Recommended Transmission Line Alignment.**




Red dotted line the recommended alignment

**Figure 14: Recommended Transmission Line Alignment**

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# APPENDIX A

# PHOTOS


Photo 1: Crossing the Tsitsa River near the Lalini Dam site.

Photo 2: Dam wall site for the Lalini Dam

Photo 3 Dam basin site for the Lalini Dam

Photo 4: The Tsitsa River gorge below the falls at approximately the position of Transmission Line 1 and the Hydroelectric power station.

Photo 5: Irrigation lands near Tsolo.

Photo 6: Irrigation lands near Tsolo.

Photo 7: The Tsitsa River below the proposed Ntabelanga Dam wall

Photo 7: Erosion donga within the Ntabelanga Dam basin

Photo 8: View from the road to Maclear across the upper reaches of the Ntabelanga Dam.